



PROTECTING THE SOFT SPOT:
THE BRIGADE'S COMBAT SERVICE
SUPPORT IN AIRLAND OPERATIONS

A Monograph
by

Major Victor M. Robertson III
Infantry



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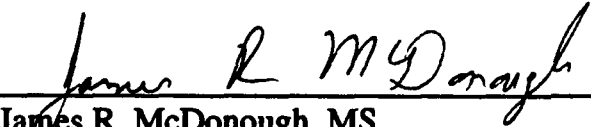
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ABSTRACT

***Protecting the Soft Spot: The Brigade's Combat Service Support in AirLand Operations*, by Major Victor M. Robertson III, USA.**

This monograph seeks to answer the question of how we can reduce the risk to the heavy brigade's sustainment system during nonlinear close operations when the enemy has advanced technology. The analysis focuses on the effects of nonlinear close operations, advanced long range target acquisition and weapons technology, and the current vulnerability of the Army's combat service support vehicles. The recommendations meet three criteria: allow the support units to survive, accomplish their support mission, and allow maneuver commanders to generate maximum combat power at the decisive point. The ways to reduce the risk to the brigade's support units include the factors of organization, equipment, training, and tactics.

This study formulates recommendations by analyzing a historical case study, current doctrine, and papers related to the Army's future doctrine. The historical case study examines Combat Command A of the Fourth Armored Division during the encirclement of Nancy in September 1944. Current doctrine used includes *FM 100-5, Operations* (1986), and relevant combat service support and maneuver doctrine. To study the nature of the Army's future doctrine this paper uses *TRADOC Pamphlet 525-5, AirLand Operations*, dated 1 August 1991, and the *AirLand Battle Future, Alternate Base Case Studies, Phases I through X*. The TRADOC pamphlet is the basis for the nature of future nonlinear operations, and the capabilities of advanced technology.

There are five primary ways to protect the brigade's support units. First, at times support units may closely follow the maneuver battalions to gain protection. Second, intelligence assets and army aviation should detect enemy threats and pass the information to artillery or attack helicopter units. The brigade or the support battalion could then use indirect fires or attack helicopters to neutralize the threat. Third, based on early warning by aviation and intelligence sources, the support units could avoid the enemy. Fourth, by echeloning the support facilities, brigades can keep some of their support assets out of range of enemy indirect and direct fire most of the time. Finally, support units could protect themselves and survive indirect fire if their vehicles were armored, tracked, and had anti-armor weapons and machine guns.

The study concludes that the Army can no longer economize as much on combat service support operations. If the Army cannot afford to implement these five protection measures, then perhaps the Army cannot afford to fight nonlinear close operations against an enemy with advanced technology.

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I. Introduction

Clausewitz said that the nature of war is defined by the relationships between a trinity of the people, the army, and the government. Some military theorists believe that in our modern era technology should be added to the trinity.¹ Whether technology changes the nature of war is an issue that can cause much philosophical debate. However it is fairly obvious that technology does have a pervasive influence on military operations. Even so, military leaders have often been slow to recognize that changes in technology and the elements of Clausewitz's trinity alters how armies should be organized, equipped, and trained to fight.

The U.S. Army is trying not to make this mistake. It studied changes in international relations, advances in technology, and changes within the United States in the relationships between the elements of Clausewitz's trinity. Based on this study, the Army developed its concept of the nature of future warfare. *TRADOC Pamphlet 525-5, AirLand Operations*, explains the Army's view of future warfare.² The Army has projected two changes in warfare that are especially significant: that future warfare will be nonlinear, and that our opponents may have technology that rivals ours.³ Together these two factors will change how the U.S. Army fights.

Currently, the Army's institutional frame of reference and way of fighting are based primarily on our experiences in World War II in Europe. The way we fought then is still the foundation for our close operations.

In WWII, nonlinear forms of maneuver such as penetrations, envelopments, infiltrations, turning movements, and combinations of these maneuvers, were used to fragment the enemy's line. This allowed us to

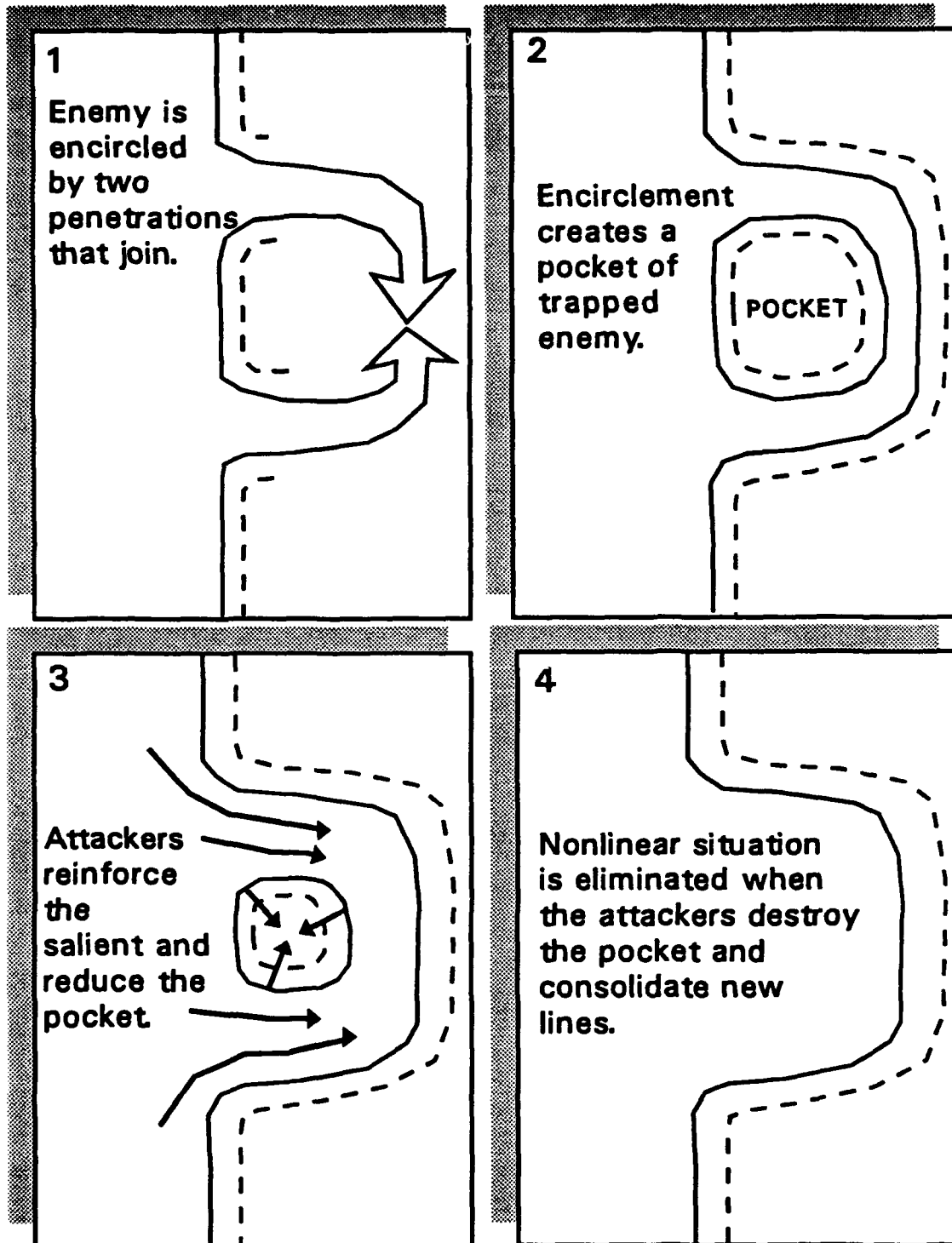


Figure #1: Attacker uses nonlinear operations (the penetrations) to move the line forward.

move our line forward. We isolated pockets of enemy troops, reinforced our forces that encircled the enemy, and reduced the pocket. Our new line became the forward edge of the forces that earlier had encircled the enemy (see Figure #1).

The units executing nonlinear operations often left their combat service support units in the area behind the line of friendly combat units.⁴ Once new lines were formed, and the area became relatively secure, they brought their support units forward. The duration of nonlinear close operations was usually short enough to allow combat units to operate without their support units.

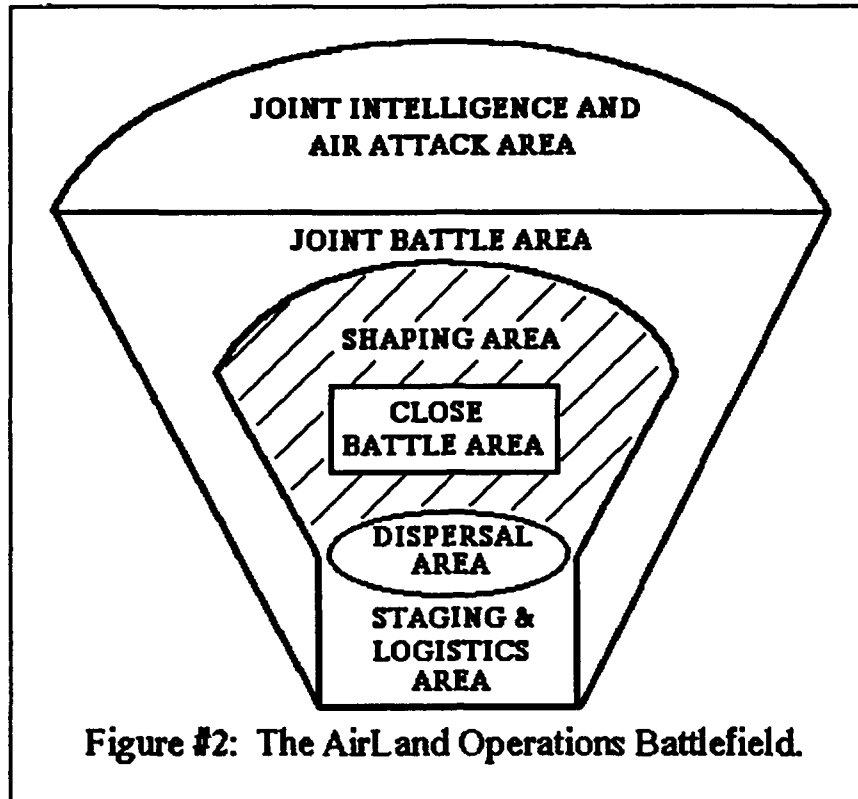
AirLand Battle doctrine still includes these ground tactics as the basis of close operations. AirLand Battle may be described overall as nonlinear in that it includes deep and rear operations. The doctrine says that lethal fires of both opponents will strike the other's rear area and will blur the difference between front and rear.⁵ However, close operations win or lose the battle, and these still occur in a linear context.⁶ Nonlinear ground maneuvers are of relatively short duration, and are subordinate to the overall purposes of linear operations. These comments do not diminish the importance of, and need for, nonlinear close operations, but should place nonlinear and linear operations in the proper perspective.

Though the doctrine recognizes that lethal weapons will attack deep and create a nonlinear battlefield, the Army has accepted risk and economizes in equipping, organizing, and training support units.⁷ Support units are lightly armed, wheeled, have almost no armor, and the soldiers are not trained to be proficient in defensive operations.⁸ Therefore, support units cannot move as rapidly as maneuver units, or survive encounters with enemy ground forces or indirect fire.

In the past, as long as a line of combat units protected support units from ground attack, the support units rarely needed to fight and they were not vulnerable to artillery (relative to combat units). Brigade and regimental support units were usually out of range of enemy artillery. This is why the Army has organized support units to defend themselves only against individuals and small groups.⁹ It is also why support units have thin-skinned vehicles. The enemy of the past did not have accurate long-range artillery. Support units could stay close enough to accomplish their support mission and still remain out of range of enemy artillery.

AirLand Operations proposes a nonlinear context and a new purpose for close operations that increases the danger to support units. Nonlinear close operations will be used to destroy enemy forces in meeting engagements before they reach our secure areas. According to *AirLand Battle Future* documents, tactical units will usually not establish lines. When linear battles do happen, commanders will seek to return to nonlinear situations.¹⁰ Nonlinear battles and engagements will be the norm; linear fighting will be the exception.

Therefore, the lower tactical echelons will not have rear areas as we do now. The first echelon that will have a relatively secure area will be the corps. Its secure area, called the dispersal area (see Figure #2), will be secure from ground attack because combat units will prevent the enemy from reaching it.¹¹ It probably will be secure from enemy artillery because the corps will attempt to prevent enemy artillery from coming within range of the dispersal area.



However, brigades usually will maneuver and fight forward of the dispersal area. They will prepare for combat in the dispersal area. Then, as part of a division, brigades will attack through the unsecure shaping area to the close combat area. The meeting engagement will occur there. The shaping and close combat areas probably will be in range of enemy long-range artillery. Undetected enemy combat units also may be in these areas. In this situation support units operating with the brigade will be in much greater danger of ground attack than previously.

Adding to the danger is the wide proliferation of advanced military technology.¹² New technology makes thin-skinned support vehicles and facilities more vulnerable to indirect fires. American technology provides examples of technology the enemy may have. The Army believes we will have indirect fire weapons that can destroy targets at greater than one

hundred kilometers.¹³ The Army also believes that our intelligence systems will tell us, almost perfectly, and almost continually, the enemy's location and actions. The leap ahead in intelligence capability will be almost revolutionary.¹⁴ "We *now have* the ability to see significant enemy forces in all weather and at great depth and to decide which forces to attack with a variety of precision systems of escalating lethality."¹⁵

These are capabilities the enemy too may have in the future. If our opponent finds our general locations, his long-range artillery will destroy our soft spot . . . thin-skinned support units. He also may be able to use countermeasures to avoid detection, and attack our vulnerable support units with combat units. The risk to our support units will increase dramatically.

The essential question here is how can we reduce the risk to the brigade's support units? To answer this question this paper will focus on the support units of a heavy maneuver brigade fighting in a mid- to high-intensity war, in central Europe, in the shaping and close combat areas. The ways to reduce the risk to the brigade's support units may include the factors of organization, equipment, training, and tactics. I will refer to these ways collectively as protection measures.

The protection measures must meet three criteria: allow the support units to survive, accomplish their support mission, and allow maneuver commanders to generate maximum combat power at the decisive point.¹⁶ The second criterion means that the support units must be able to provide continuous, responsive, and adequate support. The third criterion means that the protection measures must allow the brigade commander the freedom of action that he needs to concentrate enough combat power against the enemy to accomplish his mission.

The question of how to protect a heavy brigade's support units is important for two reasons. First, under current proposals the maneuver brigade will be the Army's basic maneuver unit. Corps will assign brigades to a division based on the mission and situation.¹⁷ Second, the battlefield environment that *AirLand Operations* describes is an environment in which the brigade's support units are not designed to operate. The new environment will be the result of an enemy with advanced technology, and the lack of a secure rear area on a nonlinear battlefield.

To cope with the new environment, the Army must develop tactics, equipment, and organizations for support units that will improve their survivability. Greater survivability will reduce the risk of their destruction when they come into harm's way. Inevitably there will be a cost for more survivability. The cost may be in more assets for the support units and perhaps reduced capability somewhere else. Since the Army budget is shrinking, anything that costs more is controversial. However, if the nature of war changes, will it cost more to change how we fight or to ignore the new reality? History suggests that we should change voluntarily before a military disaster forces change upon us.

What changes should we make? To find out, in chronological order this paper examines a nonlinear battle from World War II, nonlinear components of AirLand Battle combat service support doctrine, and the research that led to the *AirLand Operations* concept. From these sources should emerge the protection measures that will reduce the risk to brigade support units.

II. Protecting the Brigade's Combat Service Support in World War II, AirLand Battle, and AirLand Operations

The historical case study examines the actions of Combat Command A of Fourth Armored Division (4th AD) during its operations in the encirclement of Nancy in September 1944. It is an appropriate case because in many ways it is analogous to the brigade operations described by *AirLand Operations* and *AirLand Battle Future* documents.

The organization of Combat Command A (CCA) was similar to the brigade organization that AirLand Operations proposes.¹⁸ It was a powerful combined arms unit that consisted of the following organic, attached, and supporting elements:

- CCA HQ
- 37th Tank Battalion
- 53d Armored Infantry Battalion
- 1st Battalion/318th Inf Reg/80th Infantry Division (Motorized)
- 4th AD Artillery HQ
- 66th Armored Artillery Battalion
- 191st Field Artillery Battalion (155 mm How)
- 94th Field Artillery Battalion
- D Troop/25th Cav Recon Sqdn (Mech)
- C Co/24th Armored Engineer Battalion
- A Co/166th Combat Engineer Battalion
- A Co/46th Armored Medical Battalion
- A Co/126th Ordnance Battalion
- Combat Command Trains.¹⁹

Like the future brigade-level operations that this paper addresses, and some AirLand Battle operations, CCA's battle around Arracourt was a nonlinear fight between mechanized forces. CCA penetrated deep into the German rear area and then conducted a mobile 360° defense from an isolated position from 13 September to 24 September 1944. During this

period CCA's lines of support were long and vulnerable. At times CCA was isolated and had *no* line of support.

This way of fighting reflected the ideas of the division commander, Major General John S. Wood. Wood was a daring, aggressive, and creative commander who operated by ten principles that permeated his division. Three of his principles are germane to this study. First, he believed in always moving in depth because it allowed flexibility and provided security to the flanks. Second, he disregarded "old ideas of flank security, i.e., by other units on left and right." Third, he organized supplies to support movement in the enemy's depth by "taking rations, gas, and ammunition in rolling reserves."²⁰

Because of Wood's ideas, CCA gained security in untraditional ways. By penetrating deep behind enemy lines, and then conducting a mobile defense, the CCA commander, Colonel Bruce C. Clarke, made it difficult for the Germans to attack CCA's trains. Clarke gained further security by using aircraft for reconnaissance and command and control. Wood and Clarke used light liaison planes, L-4 Cubs, to see the battlefield and guide their units around enemy and terrain obstacles. To provide additional security, the XIX Tactical Air Command constantly patrolled ahead of the division and reported combat information to air force liaison officers who rode with the lead tanks.²¹

Clarke's use of aerial reconnaissance may provide a feasible way for support units to avoid enemy contact. Once reconnaissance detects the enemy, support units could move around them or use indirect fires to neutralize them.

Also because of Wood's ideas, CCA usually did not try to protect their trains by leaving them behind friendly lines.²² To support nonlinear

operations adequately, support had to be forward with the combat units. A participant in the encirclement of Nancy said, "Very early it was learned that the only way to have supplies when you need them on an operation of penetration or exploitation was to take them with you." So, during this operation, CCA overloaded their supply vehicles with enough fuel, ammunition, and rations for seven days in case the German's cut CCA's supply lines.²³ Because this technique reduced the need for supply lines, Clarke used minimum effort to protect his lines of supply. He was able to use more force to encircle the Germans.

The encirclement of Nancy began on 11 September. The 35th Infantry Division forced a bridgehead over the Moselle south of Nancy between Lorey and Crevechamps. The division's main effort, Combat Command B (CCB), attacked out of the bridgehead. The 4th AD Command Post, Reserve Combat Command (CCR), and division trains followed CCB. During the next several days CCB attacked north toward the Marne-Rhin Canal where they would later link-up with CCA.²⁴

While CCB enveloped Nancy from the south, on 12 September the 80th Infantry Division seized a bridgehead north of Nancy at Dieulouard. As the corps reserve, CCA of the 4th AD attacked out of the bridgehead at Dieulouard on 13 September to penetrate deep behind Nancy.²⁵

Colonel Clarke penetrated the German defenses with his entire unit, including the trains. The penetration began at approximately 0630 hours when D Troop attacked across the Moselle at Dieulouard. They held the bridgehead against German counterattacks until the CCA main body could cross. About 0800 the 37th Tank Battalion attacked across the Moselle and began CCA's penetration toward the objective for the day at Chateau-Salins. Chateau-Salins was about twenty miles behind German lines.²⁶

4TH ARMORED DIVISION **11-14 September 1944**

- ① VII Corps forward positions, evening 10 September
- ② 35th Div bridgehead, evening 11 September
- ③ 80th Div bridgehead, evening 13 September
- Axis of advance, armored column
- ⊗ Engagement with enemy
- ⊖ Forward infantry positions, evening 14 September

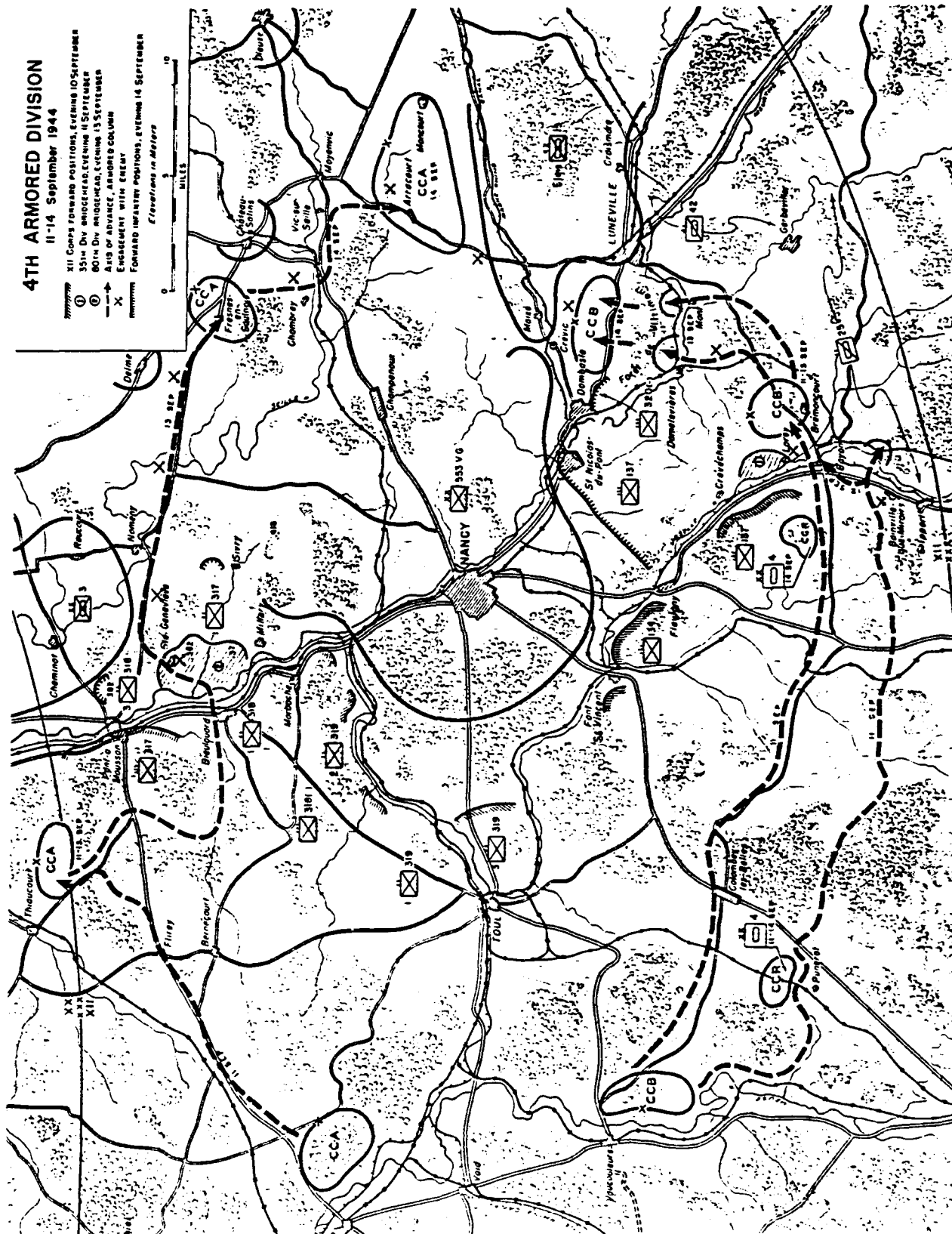


Plate #2: from Cole, The Lorraine Campaign, Map No. 12.

12-16 SEPTEMBER 1944

(Forward positions, evening 12 September
 Axis or advance CCA, 4th and Div. 10-14 Sep
 X CCA movement into the enemy
 Forward positions, evening 10 September
 Major German counterattack
 German positions (approximate), evening 10 Sep
 Elections in progress



Plate #3: from Cole, The Lorrain Campaign, Map No. 11.

During the penetration, CCA's main column gained security with screens to the north and south. D Troop screened the column's north flank from Benicourt to Lemoncourt. D Co/37th Tank Battalion and an Assault Gun Platoon from the 37th Tank Battalion screened the southern flank from Benicourt to the Seille River. D Troop continued to protect CCA's line of communication from positions at Lemoncourt and Aulnois-sur-Seille until the next day.²⁷

Even with security on the flanks, CCA's trains faced a dangerous movement along the road to Chateau-Salins. The main column encountered many engagements with small German detachments, road blocks, and antiaircraft guns. The division G-2 reported that CCA received considerable artillery fire from the flanks and rear. He reported that enemy tanks, infantry, and assault guns counterattacked CCA "from flanks and rear vic [vicinity] Nomeny and cut off CCA supply route E [east] of Dieulouard crossing."²⁸ The 4th AD Artillery Headquarters reported, "After a hard, fighting march during which a great deal of artillery fire was received from the flank, the column reached Fresnes-en-Saulnois."²⁹

By 1700 on 13 September lead elements of CCA reached Fresnes-en-Saulnois, three miles west of Chateau-Salins, and seventeen miles behind German lines. There they established a perimeter and waited until the next day for the remainder of the combat command to arrive.³⁰ CCA's units took so long to arrive because, the main body traveled in one column on one road. CCA's trains were last to arrive because they were last in the order of march. In fact, the trains had problems that delayed their arrival until the next day.

The problems that the trains faced shows that in nonlinear warfare support units must be able to defend themselves against maneuver units.

The problems began when the trains became separated from the main body during the river crossing at the Moselle. CCA's attack out of the Dieulouard bridgehead was so slow that by midnight on 13 September the lead elements of the trains had only moved about two miles east of the Moselle to the plain east of Ste. Genevieve. Trailing elements of the trains were still west of the river. Because of enemy resistance, and because the trail elements of the trains had little protection with them, Colonel Clarke decided to keep them inside the 80th Infantry Division lines until daylight on 14 September. Meanwhile, in the dark a break in the column caused the lead elements of the trains to lose contact with the snaking CCA column. The lead elements were then lost and isolated outside the bridgehead. The combat command S-4 and the trains commander formed the isolated support element into a perimeter and "fought off small German patrols throughout the night."³¹

Clarke's normal way of protecting his trains during nonlinear operations did not work this time. He routinely protected his trains by placing them directly behind the column so they "could follow along in the vacuum created by the shock of the combat column and be safely through the enemy resistance before it could recover."³² In this way he planned to achieve the optimum balance between support for his command and security for his trains. Proximity to maneuver units would protect the trains and allow responsive support.

However, the unforeseen and unavoidable events during the night of 13-14 September separated the trains from their protecting maneuver units. When enemy action threatened the trains at the Moselle, the balance between security and support disappeared. The combat units were fifteen miles away. He had neither security for his support units nor support for

his combat units. Without combat units nearby to protect them, and in darkness, the trains' vulnerability caused Clarke to keep them inside friendly lines to protect them until daylight.

Clarke, however, could not protect all of his support units. The trains' lead elements were too far forward to withdraw into friendly lines. Also, they were lost and may not have known how to get back to American lines. Even if they did know how to get back, "friendly" lines at night during a fight are not very friendly; reentering in these conditions can cause fratricide. For all these reasons, part of the trains remained outside the American lines. Only luck prevented the Germans from attacking the isolated elements of the CCA trains. Throughout the night, the 3rd Panzer Grenadier Division contained the Dieulouard bridgehead with a series of local counterattacks that came from the woods near the trains element.³³ This incident shows that in nonlinear combat, support units must be able to survive contact with enemy combat units. This suggests that support units should be able to defend themselves from attacks by small enemy combat units, and be able to defend against larger units until a friendly combat unit can intervene.

To enable a combat service support unit to defend against enemy combat units, several major changes to support units should occur. To begin with, the Army's support units currently lack the armored vehicles necessary to survive small arms fire and artillery. Therefore, our support units need armored vehicles. Armor would have protected the CCA trains from the fire of artillery and small arms while they were trapped outside American lines, and on the road to Fresnes. Armor alone will be insufficient; if the support vehicles also have anti-armor weapons and machine guns they will be able to defend themselves. Armored vehicles

and improved weapons will not help unless the men in support units are well trained in defensive operations.

Besides putting weapons on support vehicles, there is another way to allow support units to defend against combat units; the Army could integrate tanks or infantry fighting vehicles into support units. These combat vehicles could be manned by combat soldiers and be under the command of a combat arms officer. Detailed studies would have to find the optimum ratio of combat vehicles to support vehicles. With this option support vehicles will still require armor to survive indirect fire. Thus, in support units we could have armored support vehicles with combat vehicles integrated to provide the firepower.

Resuming the chronology, at daylight on 14 September the trains moved to link-up with the combat command main body. From its positions at Aulnois-sur-Seille and Lemoncourt, D Troop provided route security for the trains.³⁴ Since the route was twenty miles long, D Troop could not protect the entire route. Again, the trains had to be ready to defend themselves while they moved toward Fresnes-en-Saulnois.

On 14 September, while CCA waited for their trains to catch-up to them at Fresnes-en-Saulnois, Wood changed CCA's orders. He ordered them to by-pass Chateau-Salins, seize the high ground around Arracourt to sever the German lines of communication to Nancy, and to link-up with CCB at the Marne-Rhin Canal to complete Nancy's encirclement.

Because of these orders, Clarke abandoned his line of support to Dieulouard. As the trains moved toward Fresnes-en-Saulnois, he pulled D Troop off its positions along the road back to Ste. Genevieve. He ordered them to screen CCA's eastern flank during the attack south to Arracourt.³⁵ Clarke could sever his line of supply because he had all the supplies with

him that the combat command needed. Also, his line of communication would have been too long for D Troop to secure. Because Clarke did not need to secure his line of supply he could concentrate his combat power where it was more urgently needed. Except for air lines of communications, CCA was isolated from the remainder of the division.

Just as with combat operations under *AirLand Operations*, CCA operated around Arracourt with no secure supply line. The men of CCA were not concerned by this because they were experienced in nonlinear operations. They also were logistically prepared to be temporarily cut off from friendly lines. An account of the operation that was written by commanders and staff in CCA said, "Isolation for a 48-hour period caused no concern to any member of the command; rather it spurred them to greater alertness and activity."³⁶

When the trains closed on Fresnes-en-Saulnois, CCA resupplied, and attacked south to Arracourt early in the afternoon. By 1900, 14 September, the entire combat command closed on Arracourt. CCA established an "almostperimeter" (as the Division Artillery after action report called it) around Arracourt-Moncourt oriented north, east, and south. The trains set up inside the perimeter, about two kilometers northeast of Arracourt.³⁷

Here again the support units positioned themselves so that the combat units increased the trains' security. Clarke did not assign a combat unit specifically to protect the trains. Instead the dispositions and defensive missions of the maneuver battalions provided security to the trains as a collateral result of their combat operations.

That night CCA patrols met patrols from CCB near the Marne-Rhin Canal, completing the encirclement of Nancy. CCA's positions, however, were still eight miles from the nearest friendly unit with no secure lines of

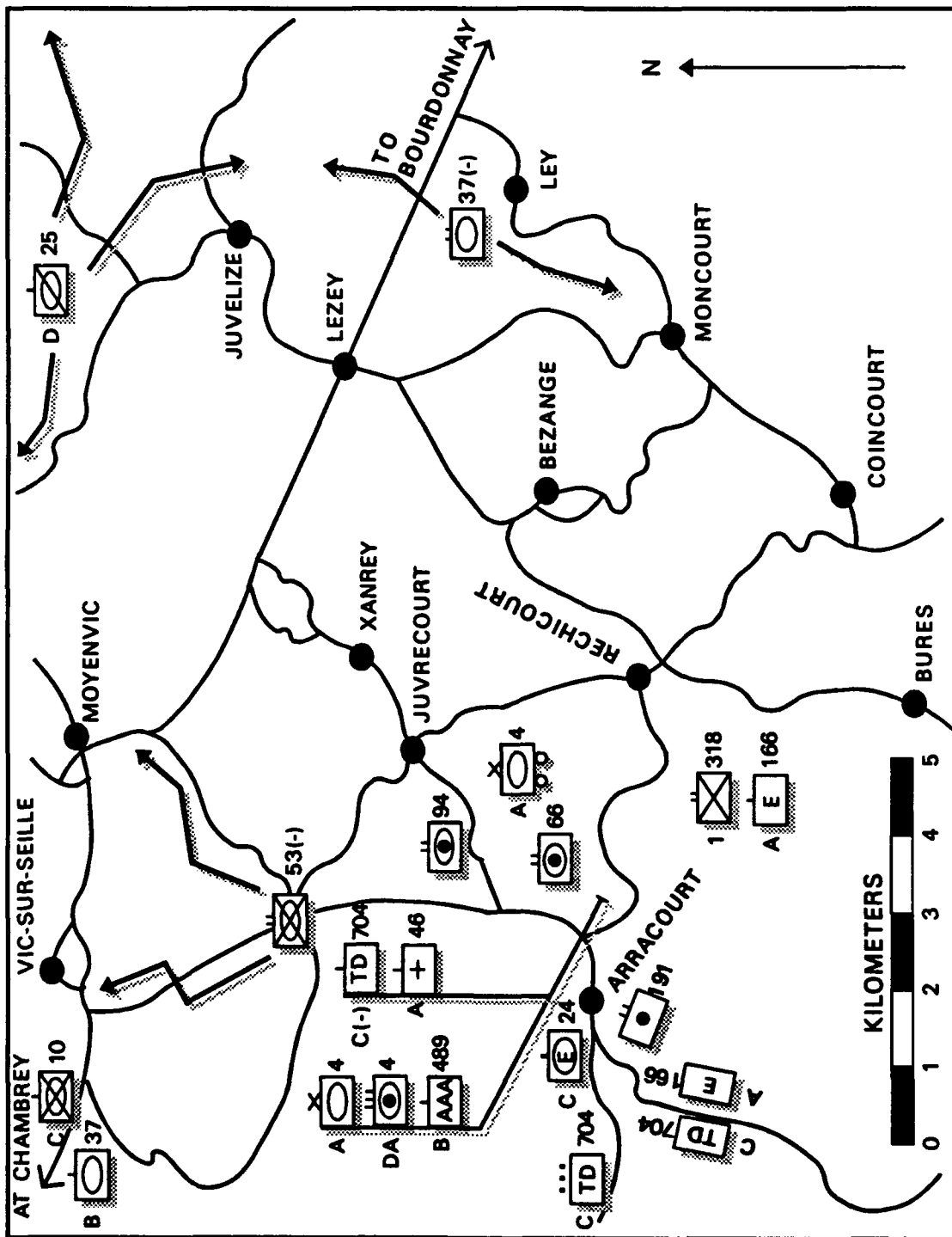


Plate #4

General dispositions of CCA, 15-18 September 1944.

(Map from *Nancy Bridgehead*, p. 12.)

support. On 16 September CCB attacked north, and passed to the west of CCA, thus opening a tenuous line of supply to CCA.³⁸

From 14 to 26 September, CCA fought a mobile perimeter defense against breakout attempts from Nancy and many counterattacks from the east. Meanwhile, XII Corps reinforced and expanded the bridgehead over the Moselle.³⁹ In the fluid situation that existed from 20 to 25 September, the division's three combat commands defended from noncontiguous positions. This nonlinear battle ended on 24 and 25 September when CCB moved west of Arracourt into mutual support of CCA and CCR. This action concentrated the 4th AD for the first time since 30 July.⁴⁰

During these fluid actions a couple of illustrative incidents occurred involving CCA's trains. The first incident is significant for two reasons: it emphasizes that nonlinear close operations increase the risk to thin-skinned vehicles, and it shows that the presence of combat units increases the trains' security. The incident happened on 19 September when the 113th Panzer Brigade counterattacked with more than 100 tanks and penetrated CCA's mobile defense to within 400 yards east of the trains. Participants in the battle said, "The combat command trains were within easy sight and close range of the German tanks and escaped destruction only because of the furious attack launched against them by B Company [of 37th Tank Battalion]."⁴¹ The trains nearly met disaster, but the presence of a combat force saved them. Again, proximity to a combat unit provided security to the trains. If the support vehicles were armored and armed, B Company's intervention would not have been as important, and perhaps not necessary.

The second incident is significant because it shows that the trains' vulnerability reduced the quality of CCA's support. On 20 September CCA attacked northeast toward Sarreguemines. Because the situation was vague,

and because of reports of German armor in the area, the CCA trains did not move with the combat command. They moved west to a more secure area near Hoeville. Colonel Clarke planned to bring them forward later with motorized infantry units.⁴² He apparently decided that either the security of the trains outweighed the need for responsive support, or that the threat was too high to burden the combat elements with protecting the trains. We do not know his reasoning, but either way, the vulnerability of the trains was a key factor in his decision.

The vulnerability of thin-skinned support vehicles caused Clarke to choose between security for his trains, responsive support for his combat units, or a compromise of both. Clarke weighed his need for responsive support against the need to preserve his trains. Since he could not afford to lose his support units, he sacrificed support to gain security for his trains. Maximum support for maneuver units, and maximum survivability for support units are conflicting goals.

Therefore, the commander must compromise. Planning for more responsive support may cost the brigade commander combat power; he may have to dedicate a combat unit to protect the trains if they are close to the battle or if the area is unsecure. This reduces his flexibility and dilutes his combat power at the decisive point. Conversely, a sustainment plan that protects support units by keeping them too far from the battle may deny responsive support to the maneuver units. This too can reduce the brigade's combat power. Therefore, the optimum support plan will keep the trains close enough to provide responsive support without unduly risking the survival of the trains. It follows that the more survivable the trains are, the closer they can remain to the maneuver units, and the better support they can provide.

Another lesson reinforced by Clarke's decision in the Sarreguemines attack is that thin-skinned support vehicles should not travel without an escort through unsecure areas. Like CCA's trains, they should stay close to the brigade's maneuver units or move forward with a follow-on combat unit. However, the support units probably will be a burden to the brigade if the support moves with the brigade during fluid situations. If the support units can survive alone, then the commander can leave them back and they can come forward alone when he needs them. If the support vehicles are armored and tracked then the brigade commander has more freedom to maneuver without as much concern for his trains.

Overall, CCA's operations in September 1944 illustrate several protection measures that will reduce the risk to the brigade's combat service support units in nonlinear warfare. Clarke and Wood showed that aerial reconnaissance, or other intelligence sources, can locate enemy threats so that support units can avoid the threat or neutralize it with indirect fires. The situations that CCA's trains faced showed that to survive in nonlinear close operations, support units must have armored vehicles, anti-armor weapons, and machine guns. They can then defend themselves against attack by enemy maneuver units and indirect fire. Finally, to be able to use their weapons systems effectively, soldiers in support units must be trained to defend themselves roughly to the same standards as an infantry or armor company.

Given these protection measures the brigade commander would have increased freedom of maneuver in nonlinear close operations. Since AirLand Battle says it is a doctrine for nonlinear warfare, one might expect that since WWII the Army would have implemented some or all of these measures.⁴³ One finds, however, that support units are as vulnerable now

as they were when CCA seized Arracourt. Support units are still thin-skinned, still very lightly armed, do not have the resources to detect enemy threats, and are still poorly trained in defensive operations (relative to combat units).

The Army's support units are still vulnerable to small arms and indirect fire because they are designed to operate the way most units did during WWII. Unlike CCA of the 4th AD, most maneuver units conducted short term, shallow nonlinear operations while they left their support units in secure areas behind friendly lines. Their support units came forward after the area was secure. The close operations of AirLand Battle doctrine still uses these tactics. The Army's support units simply are not organized, equipped, or trained to operate in unsecure areas. This fact becomes clear when we compare the doctrine of how support units operate with the doctrine that describes the capabilities they *should* have.

Doctrine that describes the operations and capabilities of support units in dangerous situations reinforces two significant facts: one, that close operations occur in a linear context; and two, that support units are not prepared to survive enemy ground attacks. Doctrine that describes threat levels in the rear area and the support of deep maneuver illustrates these points.

Threat levels I, II, and III describe the appropriate responses to different types and sizes of enemy operations in our rear area. This concept of the rear area defense shows that support units depend on a line of combat units to prevent enemy maneuver units from attacking the rear area. Note that one should not interpret literally the phrase, "a line of combat units." AirLand Battle close operations create the *effects* of a line by designating a main battle area, and a rear area at every echelon down to the battalion.

Sometimes even companies have rear areas. If the enemy operates in a unit's rear area, then he is behind our "lines."⁴⁴ When the enemy operates behind our lines, there is little our support units can do to eliminate the threat.

Threat level I describes threats that a support unit can eliminate with its own resources. Doctrinal examples of level I threats include small enemy elements such as saboteurs and terrorists. By implication, support units cannot defend themselves against enemy combat units.⁴⁵

Threat level II consists of threats that require an external non-combat arms unit to intervene. Doctrinally, the military police with fire support usually perform this role. One should note that the military police are usually spread throughout the rear area accomplishing their primary duties of controlling the circulation of traffic, area security patrols, enemy prisoner-of-war operations, and law-and-order operations.⁴⁶ Because of their primary duties, their response time probably will be too long to be useful to the support unit that is under attack. This means that if the support unit cannot eliminate the threat, the situation probably will be handled as a level III threat.

Threat level III describes threats that require a tactical combat force to eliminate the enemy.⁴⁷ Tactical combat forces are combat units whose mission is to protect the rear area against any threat that the support units and the level II response force cannot eliminate. A platoon of enemy tanks probably would be a level III threat for a support battalion. An enemy company would definitely be a level III threat.

So, in our rear area protection doctrine, we see that support units are nearly defenseless in a military sense. Without augmentation they have little more combat power than a police force of the same size. Like support

units, police forces handle terrorists and saboteurs. Like support units, they are not equipped or trained to defend against or eliminate a military combat unit. They require the help of friendly combat units.

The same situation existed during WWII. Colonel Clarke always tried to have his trains protected by a combat force. When the trains became separated from the main body at Ste. Genevieve, he kept most of them inside friendly lines until daylight. Along the road to Fresnes he kept D Troop in place to try to provide the trains some protection. When the trains moved with the combat command, he kept them close to the main formation so they could travel in the "vacuum" created by their passing. At Arracourt he kept the trains inside his 360° mobile defense. Clarke took all these precautions because he knew that the trains could not survive without the help of combat units.

Combat service support doctrine that describes the support of "deep maneuver" also shows that support units are not meant to operate in unsecure areas. Support doctrine defines deep maneuver as ground operations that occur approximately fifteen kilometers in front of the forward line of troops.⁴⁸ In other words, deep maneuvers are nonlinear close operations. Thus, combat service support doctrine implies that nonlinear close operations are uncommon and unusually risky, and it says that sustainment during deep maneuver will be tenuous:

Deep maneuver is an audacious, high speed, short-duration operation. CSS [combat service support] is austere. Brigades carry as much Classes III and V supplies as possible, using captured enemy stocks when available and doing without where necessary. Once across the FLOT [forward line of troops], only limited emergency aerial resupply and evacuation are feasible, and even that is unreliable.⁴⁹

The implication here is that support units should normally not venture into unsecure territory because they are too vulnerable. Army doctrine says that if support units do move with the brigade during nonlinear operations, combat units must surround them to protect them.⁵⁰ This situation will severely limit the brigade commander's agility.

To make *AirLand Operations* feasible in a mid- to high-intensity environment, this situation must change. Support units must be able to defend themselves so they can operate in nonlinear situations for extended periods. This way our brigades will not be forced to operate without adequate support. Even with thin-skinned trucks, CCA traveled with a seven-days supply of material. Nonlinear operations are not a valid excuse to tell combat units to do without needed supplies.

Now compare the support units' ability to defend themselves with the doctrinally desired characteristics of support units. *AirLand Battle* says that the sustainment system must be able to support and survive over long, unsecure lines of communication. Because of the pace, lethality, and nonlinear nature of the fight described by *AirLand Battle*, our support units must be rugged, flexible, and self-sufficient. Their mobility and speed must be almost as good as that of the combat forces. They must be able to concentrate and disperse rapidly, and be able to support deep operations. They must move, men, equipment, and supplies rapidly, and in needed quantities to support operations.⁵¹

These characteristics are excellent goals for our sustainment system to strive for, but our sustainment system does not have those characteristics. The fact that they are thin-skinned means that they cannot survive in unsecure areas and therefore cannot adequately support nonlinear close operations. Because they need the help of combat units they are not self-

sufficient. Because they are wheeled their mobility is not as good as the maneuver force that they support. Finally, our doctrine admits that maneuver forces may not receive the supplies they need during nonlinear close operations. If our sustainment system possessed those ideal characteristics, then the Army would not be as hesitant to send support units into unsecure areas.

Though there is gap between the ideal characteristics of our support system and its real capabilities, the system does include some protection measures that should be retained in *AirLand Operations*. Support units should continue to use and improve passive protective measures. For example, they should continue to use camouflage and to conduct most resupply operations at night and when visibility is low. They also should preposition supplies in high risk areas whenever possible.⁵² This will help support units avoid contact with enemy units.

Also to avoid contact with the enemy, support units in the brigade should echelon the trains to place as many support assets as possible out of the range and observation of the enemy. Against most current technology, the brigade's support units are relatively protected because they are usually twenty-five to thirty kilometers behind the front during the defense. During the offense they may be further forward. Without advanced technology, positioning support units deep in the brigade's rear area protects them from all indirect fires except long-range multiple rocket launchers and surface-to-surface missiles.⁵³

In the future, positioning the brigade's support units thirty kilometers behind the brigade probably will not protect them. Enemy indirect fire will be more accurate and have a longer range. Since there will be no line of combat units, enemy ground units may be behind the brigade. In this case

it will be better for the support units to be closer to the brigade, not thirty kilometers away. Again, this analysis shows that support units will need armored vehicles with anti-armor weapons to survive ground attack and indirect fire.

Current doctrine does not emphasize enough the coordination that should happen between the support battalion commander and other elements that can help him.⁵⁴ The reason probably is that the brigade's support units usually receive little support from the brigade's artillery, intelligence, and aviation assets. In the future the brigade commander should allocate some of those assets to the support battalion commander during phase four of the *AirLand Operations* operational cycle. This will allow the support units to locate and avoid or neutralize enemy that threaten the brigade's reconstitution. This will be especially important while the support units are moving through unsecure areas to link-up with the brigade to conduct the reconstitution. Since our support units do not usually receive this kind of support, support commanders will have to be educated and trained to synchronize the battlefield operating systems.

This analysis of the Army's current sustainment system suggests that the system has a "split personality." The passive measures that support units use are effective now and will be useful in nonlinear close operations. On the other hand, support units are not organized, equipped, or trained to operate in nonlinear close operations. However, AirLand Battle doctrine describes the characteristics that the sustainment system should have to be able to operate in a nonlinear environment. It is therefore not surprising that the ideal characteristics of AirLand Battle support doctrine are nearly identical to the characteristics of support units and their operations in *AirLand Operations*.

AirLand Operations says that units must be able to assemble and move great distances with little warning, and that brigade operations will be intense and short.⁵⁵ It follows that the sustainment system must support the brigade in a way that allows the brigade to fight in this manner.

As in AirLand Battle doctrine, in *AirLand Operations* the brigade's support units will provide continuous and responsive support. Support will be responsive because support units will be forward during decisive operations. Support will be continuous because support units will be organized to support the brigade throughout the operational cycle (see appendix B for details about the operational cycle of *AirLand Operations*). The purpose of sustainment will be to provide the maneuver commander freedom of action to execute his plan.⁵⁶ To provide continuous and responsive support, the brigade's support units must be positioned close to the battalions of the brigade throughout the operational cycle. To allow the commander freedom of action, the support units must not burden the brigade by requiring a combat force to protect them at all times. How then will the brigade's support units protect themselves while they maneuver to link-up with the brigade to conduct reconstitution?

The following example illustrates three feasible protection tactics: positioning support units so that combat units provide security, avoiding the enemy by hiding when we detect him, and echeloning support units to minimize their vulnerability to attack. The support units can closely follow the brigade part way to the close fight.⁵⁷ During WWII, this basically was Clarke's standard technique with his trains. Once the brigade contacts the enemy, support units should stop, hide, and set up a defense until the fight is over. The support units should hide out of range of direct fire. The support that follows the brigade may not be able to stay out of indirect fire

range because of the vastly increased ranges of future artillery. This fact supports providing armored vehicles to support units.

To minimize the support assets that are within range of enemy artillery, the brigade may echelon its support units. The support commander may establish a unit maintenance collection point five to seven kilometers from the close battle, a forward support area twenty to thirty kilometers from the close battle, and leave a rear support area seventy to one hundred kilometers from the close battle. The rear support area will normally be in the dispersal area.⁵⁸ (See Appendix C for diagrams of this support concept.)

To reduce further the support units that are within range of enemy artillery, the Army is considering moving some support assets from lower echelons to higher echelons. In organizations that are proposed for *AirLand Operations*, support assets will be concentrated at brigade and corps level. Battalions will have little organic support. Also, they will not be burdened by planning and executing sustainment operations.⁵⁹ Many people oppose this plan because they believe that battalions and divisions will not receive the proper support from brigade and corps headquarters. The disagreement seems to create a choice between adequate support for battalions and divisions and survivability for the support units. Only realistic wargaming, which is beyond the scope of this paper, can produce the optimum solution.

During movements, support unit commanders must carefully decide whether they will move with the brigade or will reposition after the brigade has departed. Support units that closely follow the combat units during movement will initially gain security. This method will provide security only until the brigade nears a fight. Then the support units must stop, hide, and set up a defense. This will give the maneuver commander the freedom

to maneuver and concentrate his combat power against the enemy. This technique is similar to the way Clarke handled his trains at Arracourt. He placed them in a central position, and then deployed his battalions forward to fight mobile defenses. The battalions were not burdened by the near presence of support units.

If the brigade's forward support units stay in the dispersal area initially, they may have to cross unsecure territory alone to link-up with the brigade during reconstitution. Though secure initially, they cannot provide responsive support and they accept greater risk later by moving alone. In most situations, the support units will gain the optimum degree of security and responsive support by staying close to the brigade throughout the operational cycle. CCA illustrated this point at the Moselle River when the trains became separated from the main body of the combat command. While Clarke kept a portion of the trains inside friendly lines that night, the combat command was separated from its combat service support. The next morning, to link-up with the combat command the trains had to travel nearly twenty miles to Fresnes with very little security enroute. No doubt some good luck and a weakened enemy helped them arrive safely.

Beyond positioning tactics, the support commander should be able to avoid or possibly neutralize enemy threats. The ability to neutralize threats will be new to commanders of support units. To do this the support commander will need resources that currently he does not have. Additional resources may be difficult to get during the first three phases of the operational cycle. However, during the last phase of the operational cycle, sustainment operations become, in effect, the main effort. Maneuver commanders will focus their resources to establish security at the reconstitution site and to restore combat power for follow-on operations.⁶⁰

Therefore, the brigade commander should allocate more assets to the commander of the Forward Support Battalion (who commands the brigade's habitually associated support units) than is normal under current doctrine. The support commander can use these assets to improve his security. The question is, what assets will he get, and how should he use them?

The brigade commander may give the support commander resources such as artillery, engineers, air defense, aviation, and intelligence. This would give support commanders the quantity and quality of support that generally only maneuver commanders get now.

However, it is more likely that the brigade commander will retain control of these assets. He can then use them to support and protect the brigade's reconstitution activities. Unless the brigade commander allows the support commander to conduct the fight against remaining enemy threats, the support commander does not need such extensive support. Even with additional resources and armored vehicles, fighting still will not be his primary mission.

Nevertheless, at times the brigade commander should give the support battalion army aviation and intelligence assets. Since our support commanders may not be accustomed to controlling these assets, they will require training to be able to synchronize these assets to accomplish their mission. These resources will provide the support battalion the increased security that it needs during nonlinear close operations.⁶¹ Whether the support units are moving, or are stationary at the reconstitution site, army aviation can screen and conduct reconnaissance for them. Intelligence assets can observe reconstitution sites and locate remaining pockets of enemy. Then maneuver units, indirect fires, or attack helicopters can

neutralize the threat.⁶² If combat elements are not available, then the support units at least will be able to avoid the enemy.

Avoiding the enemy, however, will not always work. The enemy will use countermeasures, and sometimes he will find our soft spots. For this reason the brigade's support units must be able to survive indirect fire and be able to defend against ground attack.

How will support units be able to do this? A force that is ready to intervene may be able to help defend against a ground attack. As in AirLand Battle doctrine, the military police may be able to fill this role.⁶³ However, due to scarce resources, the military police probably will not conduct security operations forward of the dispersal area. The military police's ability to protect support units will depend on how many military police the division can allocate to a brigade and how they are armed and trained. Currently, the military police are not well resourced for their security role. The decreasing budget makes it unlikely that they will receive enough priority to be well resourced for it in the future. There are no other non-combat reaction forces that can intervene. Even if there were, a reaction force would not protect support unit from indirect fire. Again, we are left with the question of how to survive indirect fires and contact with enemy maneuver units. Providing support units with tracked armored support vehicles seems to be the solution.

The Army's logistics proponent said that the Army needs armored maintenance vehicles and armored rearm and refuel vehicles.⁶⁴ These vehicles would provide armor for three of the four most critical supplies and services: ammunition, fuel, and maintenance. The fourth critical item, medical support, already uses armored field ambulances. If the brigade's support units had these armored vehicles, then all the critical support that a

brigade required would be nearly as survivable as the brigade's combat forces.

Reinforcing this assessment, but going a step further, the Armor School said that support vehicles need survivability *and mobility* similar to the combat vehicles that they support.⁶⁵ Thus, in the Armor School's opinion, support vehicles should be armored and tracked.

Even so, there are currently no plans to develop or procure armored or tracked support vehicles to support brigades. With the current budget priorities there are not enough funds to equip support units with armored tracked vehicles.⁶⁶ Yet the benefits are difficult to deny. To be as mobile as the brigade, all vehicles that support the brigade should be tracked. To survive attacks by enemy long-range precision fires, support vehicles should be armored. Thus, we need a family of armored and tracked support vehicles to provide ammunition, fuel, medical support, and maintenance support to the brigade forward of the dispersal area. Currently, there are two armored tracked support vehicles fielded: the M88A1 Medium Recovery Vehicle, and the Field Artillery Ammunition Support Vehicle (FAASV).⁶⁷ Unless priorities change, they will be the only support vehicles the US Army has that are as survivable and mobile as the force they support.

III. Conclusion

The protection measures that the Army should adopt for combat service support units emerge from the nature of nonlinear close operations and the combat service support mission. Because support units must operate with

the brigade in the shaping area and close combat area, they will operate routinely in unsecure territory. In the worst case our support units will be vulnerable to enemy ground attack and indirect fire. This will happen if the enemy has target acquisition and weapons technology similar to ours.

The purpose of this paper is to recommend ways to protect the brigade's support units against this increased threat. Recommendations of how to protect the brigade's support should maximize the brigade commander's combat power. To do this we must compromise between security for the support units, support methods, and the need to allow the brigade commander to concentrate maximum combat power at the decisive point. "Maximum" means the maximum combat power that the commander can achieve within existing constraints. The more constraints he has, the lower will be his "maximum" combat power.

One way to reduce the commander's constraints and thereby increase his combat power is to ensure that protection methods for support units allow continuous and responsive support. To do this, the brigade's support units must deploy close enough to the brigade to provide timely service. This places the support units in unsecure terrain, and increases the risk that the enemy will destroy them. Without keeping the support units back in the dispersal area, how can we protect the brigade's support units?

There are five primary ways to protect the brigade's support units in *AirLand Operations*. First, at times support units may closely follow the maneuver battalions to gain protection. AirLand Battle doctrine and the experiences of CCA during WWII confirms that this protection measure works.

Second, intelligence and army aviation should detect enemy threats and pass the information to artillery or attack helicopter units. The brigade or

the support battalion could then use indirect fires or attack helicopters to neutralize the threat.

Third, based on early warning by aviation and intelligence sources, the support units could avoid the enemy. Clarke's use of light observation planes to guide his combat command around terrain obstacles and enemy threats supports this suggestion. Support units also can avoid the enemy by using standard passive defensive measures such as night resupply operations, camouflage, and pre-positioning supplies forward.

Fourth, by echeloning the support facilities, brigades can keep some of their support assets out of range of enemy indirect and direct fire most of the time. AirLand Battle doctrine effectively uses this technique at all echelons.

Finally, support units could protect themselves and survive indirect fire if their vehicles were armored, tracked, and had anti-armor weapons. This suggestion will be an imperative when nonlinear close operations become routine, and when the enemy has advanced technology. Modernizing support vehicles will remove many constraints that reduce the brigade's combat power now. The brigade commander will not face stark choices between responsive support, survivability of the brigade's support units, or burdening his battalions with the task of protecting support units. Also, support vehicles will not slow the movement when the trains move with the brigade. Clarke faced these choices at Arracourt when he decided to leave his trains behind during the attack to Sarreguemines.

These five protection measures complement each other because together they meet the three criteria that our protection measures must satisfy. Extreme emphasis on avoiding the enemy could prevent responsive and continuous support for the brigade. The support units must be able to

fight through some enemy resistance to accomplish their mission. Thus, the support of the brigade's fires and the advantages of armored and tracked vehicles will allow the support units a chance to accomplish their mission when they cannot avoid the enemy. Positioning themselves close to the brigade will inherently enhance the brigade's support and also provide the support units with protection from large enemy threats. However, keeping the support units dependent on combat units for protection will reduce the brigade commander's agility and his ability to concentrate overwhelming combat power at the decisive point. Proximity to combat units is good as long as it is not essential.

Routine nonlinear close operations will turn all soldiers on the battlefield into fighters. Combat service support soldiers will fight to support the combat units. Combat soldiers, as always, will fight to defeat the enemy. Nobody will be protected by a forward line of friendly troops. Accepting nonlinear war means accepting new ways of fighting, new ways of supporting, and new costs.

The intent of these suggestions is to describe the features of a sustainment system that meet the three criteria that I established initially. The suggestions are based on the nature of nonlinear close operations, and on an enemy with advanced technology. If we cannot afford to implement these suggestions, then perhaps we cannot afford to conduct nonlinear close operations against an enemy with advanced technology.

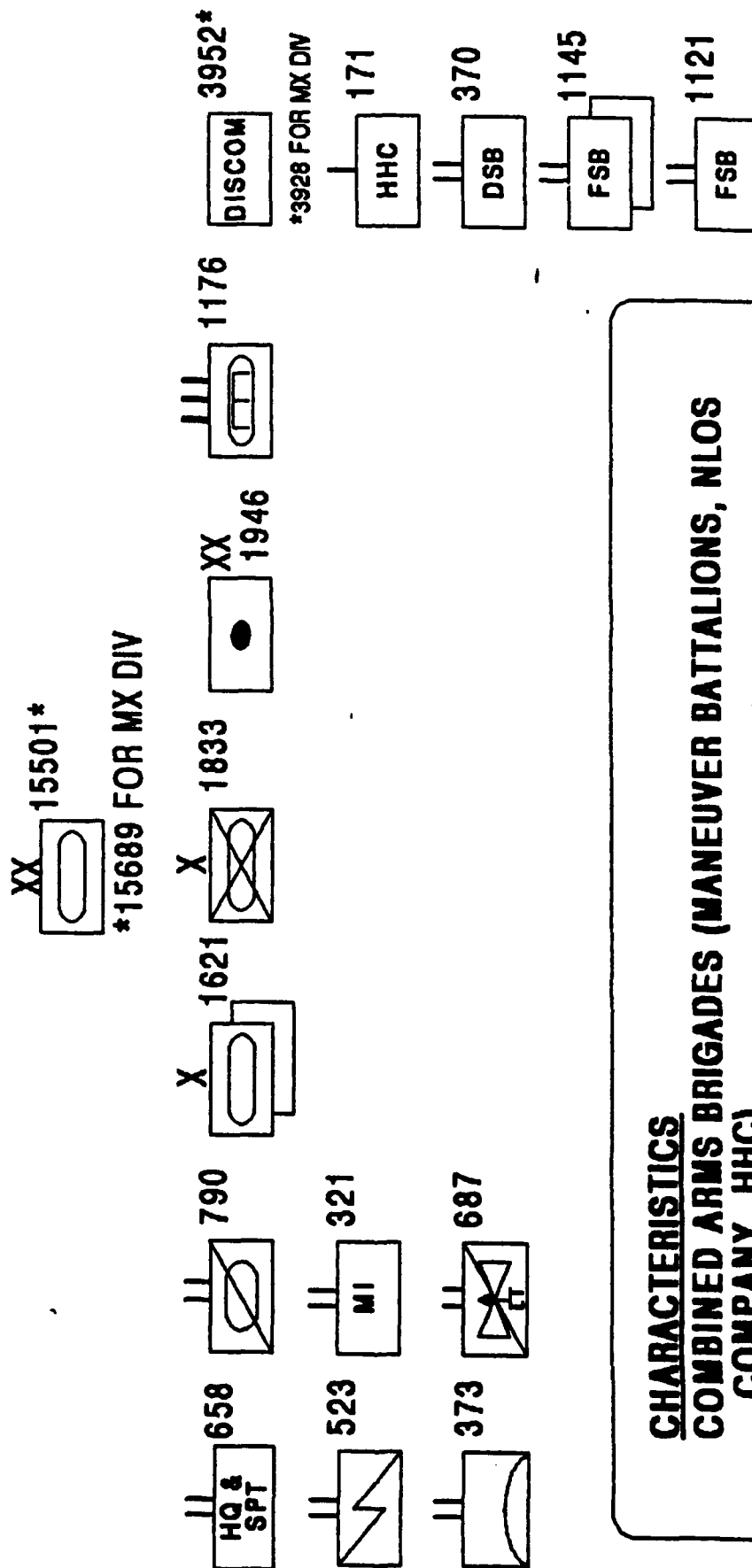
Appendix A: Proposed Organizations for *AirLand Operations*.

Proposed plans show that each heavy corps will contain three division headquarters, one separate motorized brigade, one heavy separate brigade, and nine other heavy brigades. The divisions are designed to focus command and control on the tactical aspects of the battle, and to coordinate sustainment efforts, while corps and brigades execute the tactical and sustainment plans.⁶⁸

The nine heavy brigades will be organic to the Corps, not to a division. They will be designed to fight under a division headquarters. Corps will be able to task organize its divisions based on the mission and situation. Brigades will have organic battalions of armor and mechanized infantry. Support battalions, artillery, engineers, and air defense artillery will be habitually attached to the brigades. This design will create a combined arms brigade. Previous studies have concluded that a combined arms brigade will enhance agility and combat power.⁶⁹ See the charts on the following pages for details of proposed *AirLand Operations* organizations.⁷⁰ To compare proposed *AirLand Operations* organizations with AirLand Battle organizations, see Appendix E.

ARMOR DIVISION CLEAR ALTERNATIVE

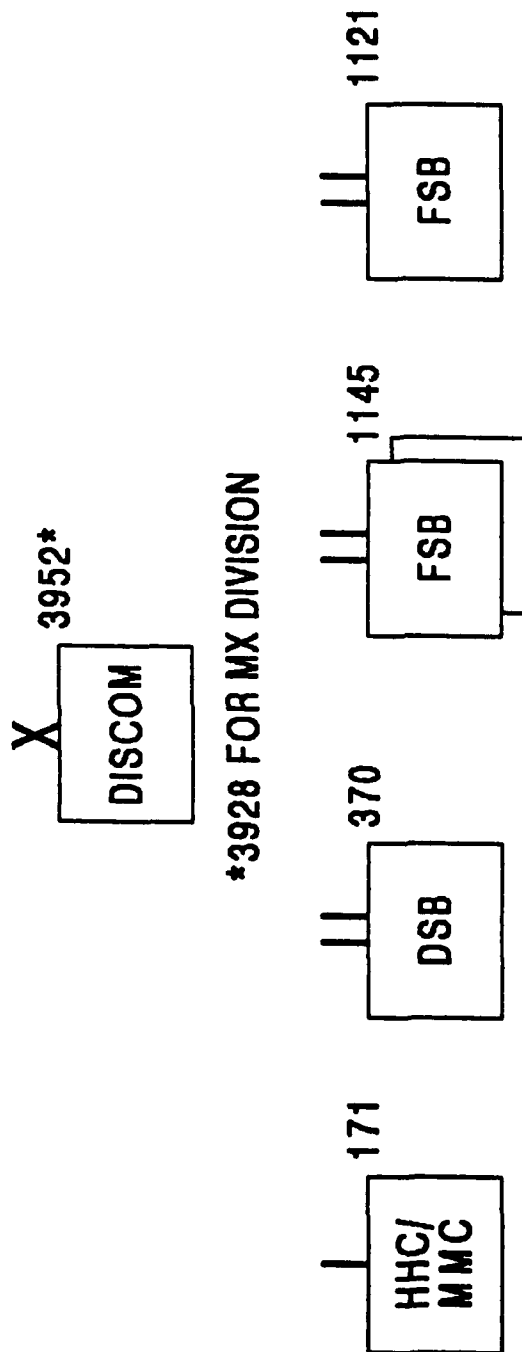
Plate #5



CHARACTERISTICS
**COMBINED ARMS BRIGADES (MANEUVER BATTALIONS, NLOS
 COMPANY, HHC)
 LOG CONCEPT APPLIES
 ARTY, ENGR, ADA, FSB IN A DS+ RELATIONSHIP TO BDES
 DIV AVN BN (RECON/LT ATK)
 FOUR SIGNAL NODES**

DIVISION SUPPORT COMMAND CLEAR ALTERNATIVE

Plate #6



CHARACTERISTICS

HHC/MMC CO CONTAINS:

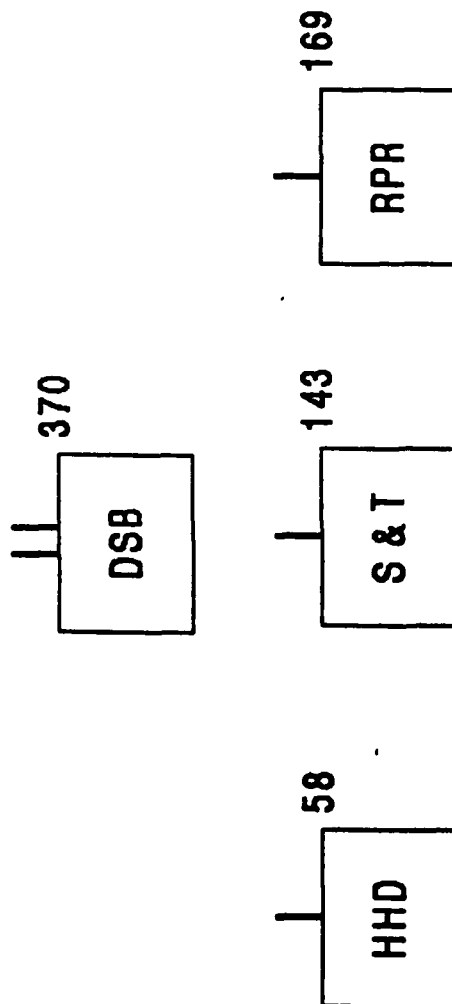
DISCOM STAFF

DMMC

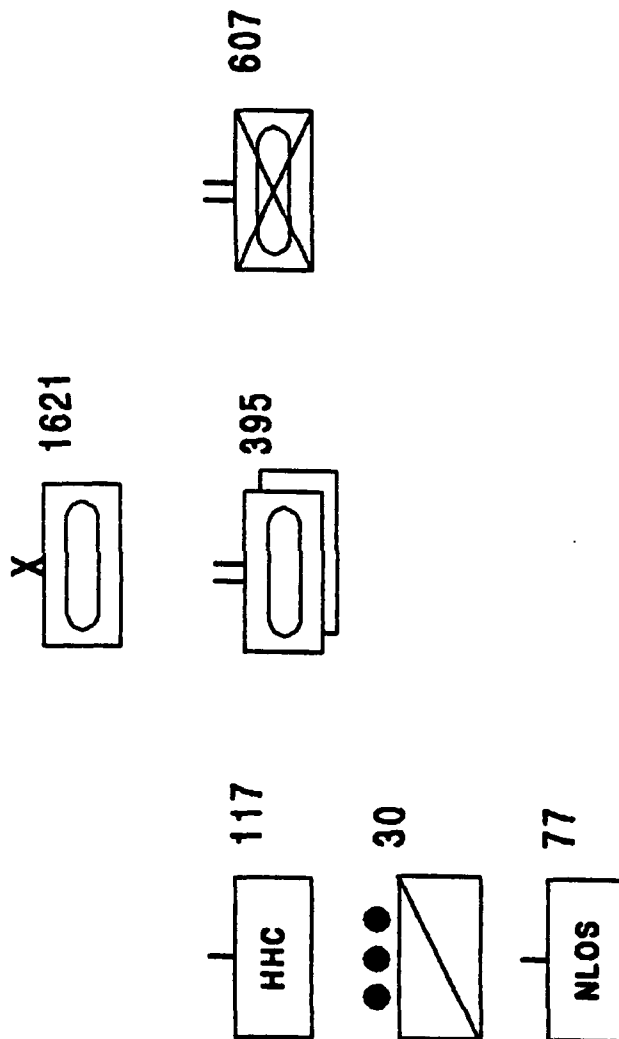
PLANS AND OPS STAFF

FSBs DS+ TO BDES
LOG CONCEPT APPLIES

DIVISION SUPPORT BATTALION CLEAR ALTERNATIVE



ARMOR BRIGADE CLEAR ALTERNATIVE

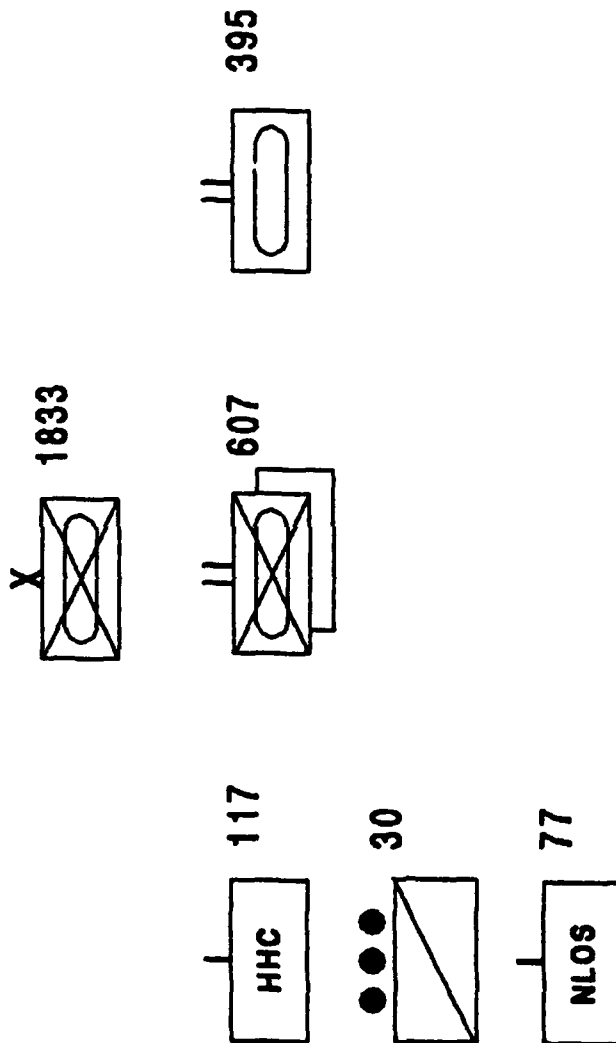


CHARACTERISTICS

TANKS - 88
FIFV - 44 (INTERIM: BRADLEY - 53)
M113 - 21
120MM MORT - 12
LOS-AT - 18
AAWS-M - 27
NLOS - 12

ARTY BN, ENGR BN, FSB,
ADA BTRY ARE DS+
MI PLUSUP IN HHC

MECHANIZED BRIGADE CLEAR ALTERNATIVE

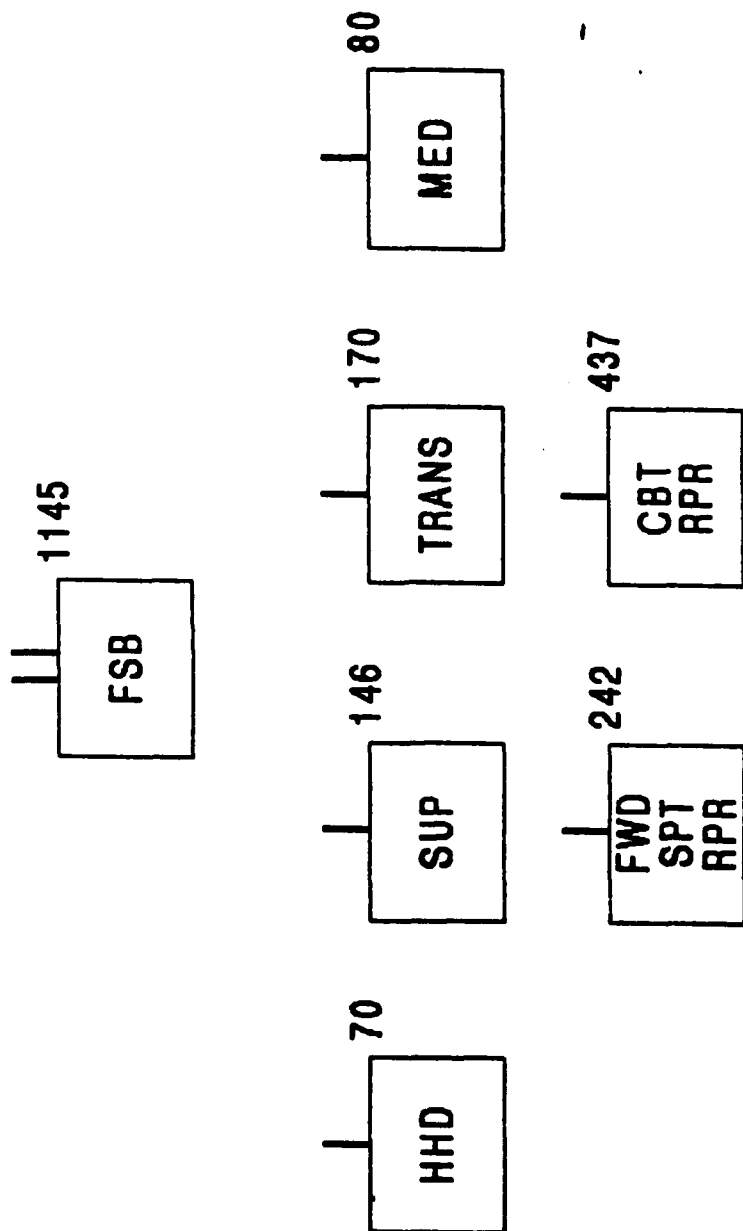


CHARACTERISTICS

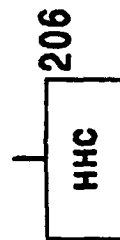
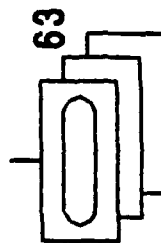
TANKS - 44
FIFV - 88 (INTERIM: BRADLEY - 106)
M113 - 21
120MM MORT - 12
LOS-AT - 18
AAWS-M - 27
NLOS - 12

ARTY BN, ENGR BN, FSB,
ADA BTRY ARE DS+
MI PLUSUP IN HHC

DIVISION SUPPORT COMMAND CLEAR ALTERNATIVE



ARMOR BATTALION CLEAR ALTERNATIVE

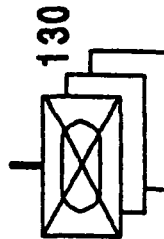
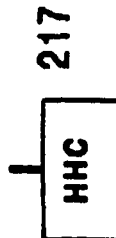


TANKS - 14
M113 - 1
HMMWV - 1
5T TRK - 1
WTR TRL - 1

TANKS - 2
LOS-AT - 6
120MM MORT - 4
MORT CAR - 4
M113 - 7
M577 - 7
FSV(S) - 10
HMMWV - 15
5T TRK - 8
1 1/2T TRL - 2
HEMTT CGO - 6
HEMTT POL - 3
WTR TRL - 3
MKT - 2
M88 - 3

MECHANIZED BATTALION CLEAR ALTERNATIVE

Plate #12



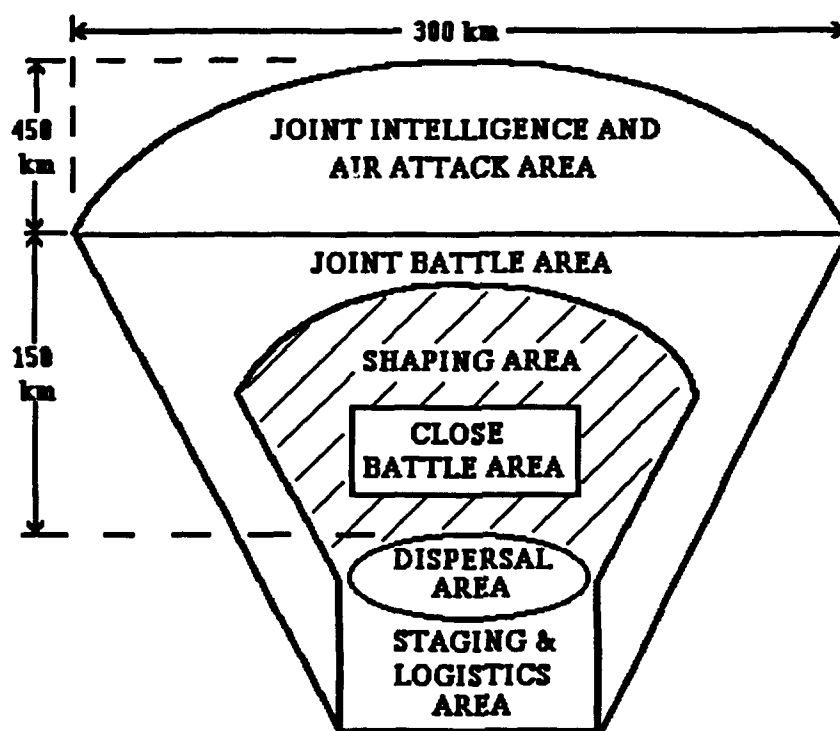
FIFV - 2
(INTERIM: BRADLEY - 2)
FSV(S) - 10
M577 - 6
120MM MORT - 4
MORT CAR - 4
LOS-AT - 6
M88 - 3
HMMWV - 23
5T TRK - 7
HEMTT CGO - 6
HEMTT POL - 3

HEMTT WRKR - 1
HEMTT TRL - 4
AMS-H - 2
FPW - 4
MK19 - 12
M113 - 7
MKT - 2
WTR TRL - 2

FIFV - 14
(INTERIM: BRADLEY - 17)
HMMWV - 1
5T TRK - 1
1 1/2T TRL - 1
AMS-H - 14
AAWS-M - 9

Appendix B: The AirLand Operations Battlefield.

The battlefield will have six areas that embody the functions that are the stages of the operational cycle of *AirLand Operations*. The stages are detection/ preparation, establish conditions for decisive action, decisive operations, and force reconstitution. These four stages form a continuous operational cycle that will occur simultaneously at tactical and operational echelons.⁷¹



During the first stage, detection/preparation, the Army and Air Force focus on gaining intelligence of the enemy and on preparing for combat. The intelligence effort will be focused in the joint intelligence and air attack area. The U.S. will attempt to gain the initiative using joint reconnaissance, intelligence, surveillance, target acquisition, and air power.⁷²

During stage two, establish conditions for decisive operations, "conditions for decisive maneuver are established by synchronizing joint fires such as long-range artillery cannons, missiles and rockets, attack aviation, and tactical air assets, while concurrently positioning maneuver forces."⁷³ The long-range fires will occur mainly in the joint battle area and the shaping area.

Once the commander decides that fires, possibly with limited maneuver force assistance, have created the proper conditions for decisive maneuver, the third stage begins. During decisive operations the commander orders maneuver forces into the close battle area to defeat the enemy.⁷⁴ This is where the predominantly nonlinear close operations occur.

The *AirLand Operations* battlefield contains six areas. The areas make up "one extended battlefield" where military operations focus on enemy forces rather than on terrain.⁷⁵

The staging and logistics area is where U.S. forces deploy into the theater to build up, and where they redeploy out of the theater. Also, this area contains major logistics bases and air bases.⁷⁶

The dispersal area contains dispersed combat, combat support, and combat service support forces that are preparing for combat. They remain in the dispersal area until the commander commits them to combat. This area is out range of all enemy fires except long range tactical and strategic ballistic missiles.⁷⁷

The shaping area initially separates the dispersal area from enemy forces. The shaping area is where "the operational commander chooses to engage enemy forces to destroy selected capabilities or elements and separate them in space and time to aid in their defeat." The shaping area must be large enough to establish and initiate the operation plan and to

provide security.⁷⁸ Some diagrams show it to be 200 to 350 kilometers from enemy territory. The dimensions shown on the diagram are for a corps area of operations in central Europe. In any scenario the width and depth of the area will depend on the mission and situation.⁷⁹

Inside the shaping area is the close battle area. This is where the operational commander decides to conduct decisive close operations. Here our maneuver forces will engage and destroy enemy forces.⁸⁰

Beyond the shaping area lies the joint battle area. This is "where Army forces fight to the depth of all their weapons systems and where Army and Air Force capabilities overlap."⁸¹

Finally, the deepest part of the theater contains the joint intelligence and air attack area. This area is where national and joint intelligence agencies operate and where the Air Force conducts interdiction and offensive counterair operations.⁸²

Appendix C: Diagrams of *AirLand Battle Future* Support Concepts.

(The following diagrams are from AirLand Battle Future, Alternate Base Case Study, Phase III, pages XIV-17 through XIV-21.)

AIRLAND BATTLE - FUTURE MANEUVER PHASE

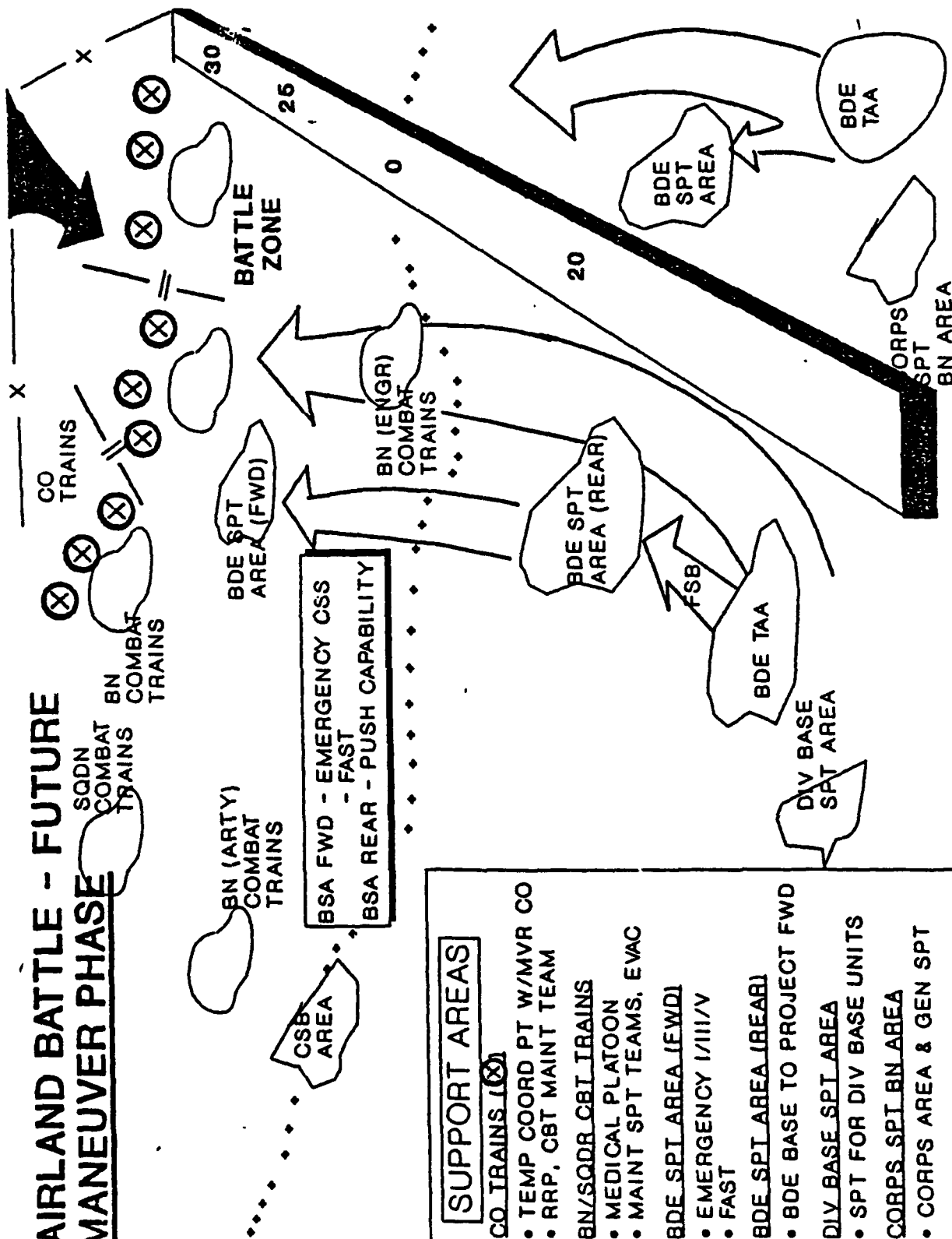
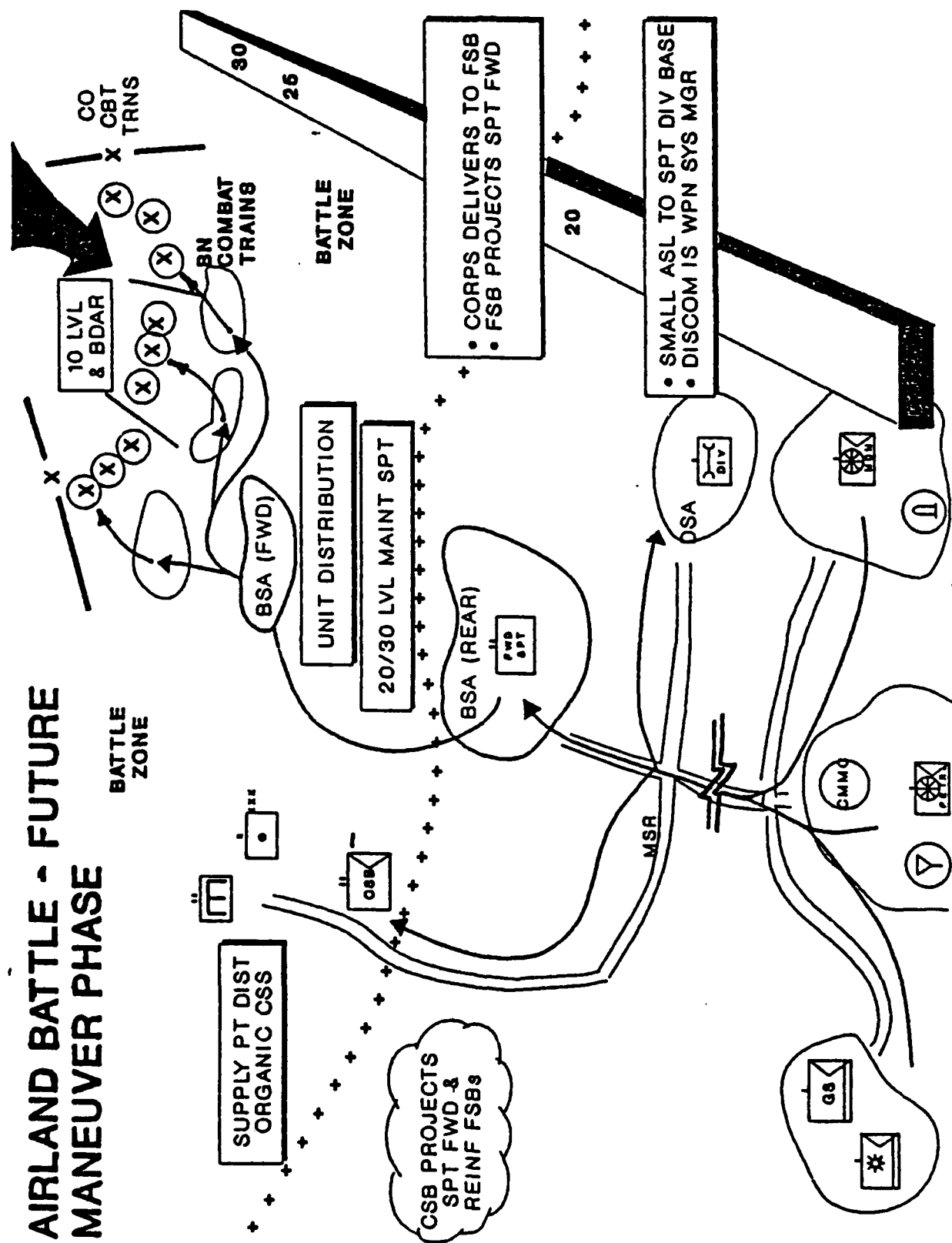


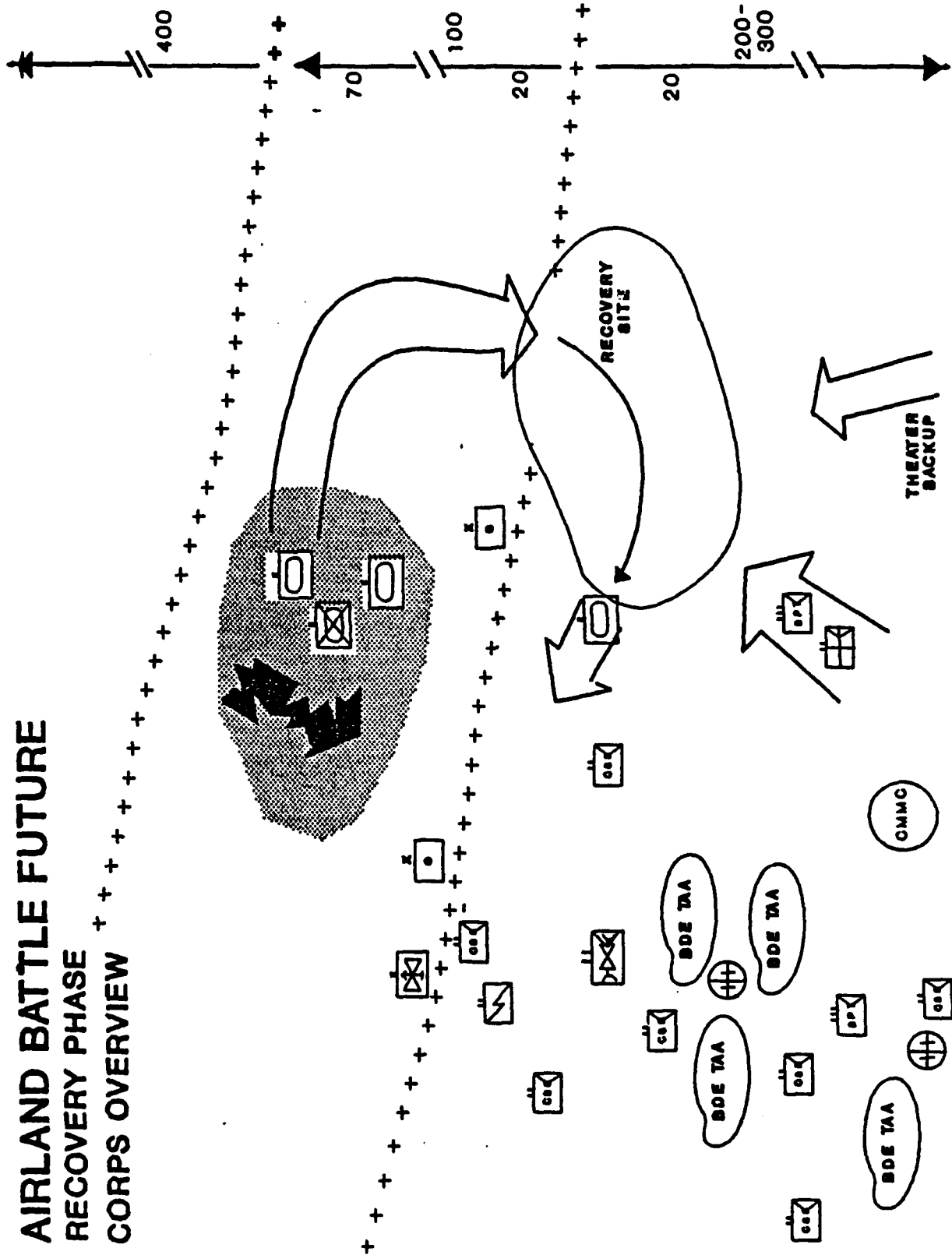
Plate #14



AIRLAND BATTLE FUTURE

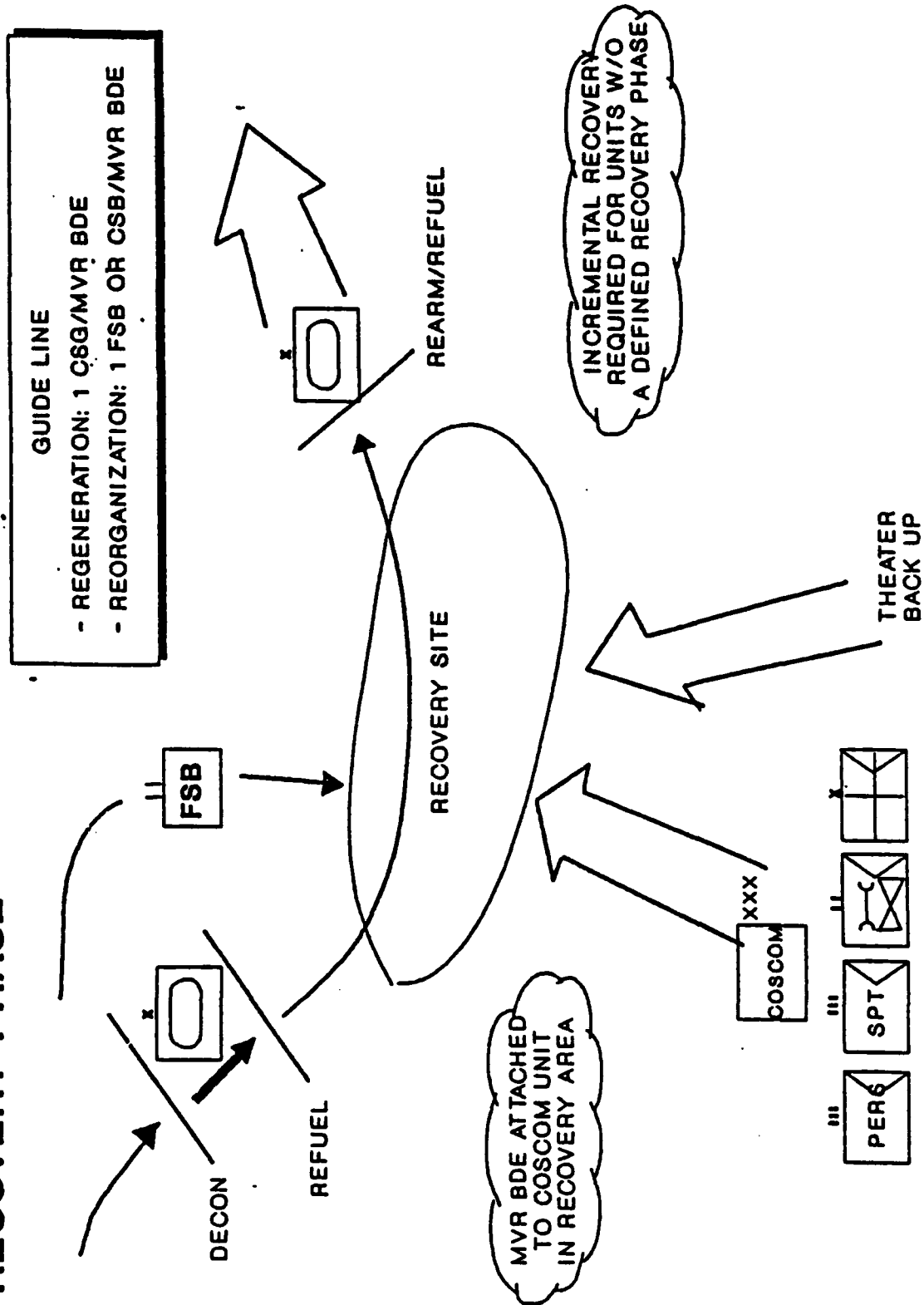
RECOVERY PHASE

CORPS OVERVIEW



AIRLAND BATTLE FUTURE RECOVERY PHASE

Plate #16



AIRLAND BATTLE FUTURE RECOVERY PHASE

Plate #17

KEY ACTIONS

- CLASS I & WATER
 - SERVE HOT MEAL
 - REPLENISH MRES & WATER
- CLASS III/II(P)
 - ROM INTO & OUT OF RECOVERY SITE
 - III(P) TO SPT RCVY OPS & REPLENISHMENT
- CLASS V
 - REARM ON MOVE OUT OF RCVY SITE
- CLASS VII
 - ISSUE NEW/REPAIRED EQUIPMENT
- CLASS IX
 - SPT RECOVERY OPERATIONS
 - REPLENISH COMBAT SPARES
 - REPLENISH FSB ASL & SHOP STOCKS
- DECONTAMINATION
 - DELIBERATE PERSONAL & EQUIP DECON IN ROUTE TO RCVY SITE
- SERVICES
 - BATH
 - LAUNDRY
 - CLOTHING EXCHANGE
- MEDICAL
 - INJURY TREATMENT
 - CONTINUOUS MED MGT
 - EXPEDITE CLVIII RESUPPLY
 - RETURN TO DUTY SELECTION
- MAINTENANCE
 - PMCS
 - PROPER REPAIR OF BDAR
 - EQUIPMENT RECOVERY/EVAC
 - FIELD & GS MAINT
- PERSONNEL SERVICES
 - PERSONNEL REPLACEMENT
 - INDIVIDUAL SERVICES
 - FINANCE SERVICES
- GRAVES REGISTRATION
 - EVAC OF REMAINS FROM RCVY SITE & BATTLE AREA

Appendix D: Battlefield Structure in AirLand Battle.

An important characteristic of AirLand Battle is the concept of attacking the enemy throughout his depth simultaneously with close, deep, and rear operations.⁸³ This concept becomes increasingly important as weapons and intelligence gathering technology improve. In fact, *AirLand Operations* is a modification of this concept that is designed to capitalize on improved technology.

At the tactical level, close operations are activities that contribute toward winning engagements: maneuver (including deep maneuver), close combat, indirect fire support, combat support/service support of committed units, and command and control. The outcome of close operations decides the battle.⁸⁴ The *AirLand Operations* equivalent is the close fight that occurs in the close battle area during the decisive operations phase.

Deep operations are actions against the enemy designed to enhance future close operations. They improve the conditions under which we will execute close operations. The primary purpose of deep operations is to deny the enemy freedom of maneuver, and to disrupt his synchronization.⁸⁵ The *AirLand Operations* equivalent are the deep fires from artillery, Air Force assets, and Army aviation during the phase II, establish conditions for decisive operations.

Rear operations defend against the enemy's deep operations.

Rear operations at any echelon comprise activities rearward of elements in contact designed to assure freedom of maneuver and continuity of operations, including continuity of sustainment and command and control.

Four specific activities are a routine part of rear operations: assembly and movement of reserves, redeployment of fire support, *maintenance and*

*protection of sustainment efforts, maintenance of command and control.*⁸⁶

In *AirLand Operations* rear operations will have to be renamed. At the division level and below there will be no rear area. So these activities will occur forward in the shaping and close battle areas as well as in the dispersal area.

AirLand Battle doctrine says that tactical rear operations assure uninterrupted support of the battle by stressing security of rear area activities and facilities. Because we cannot be strong everywhere, commanders will concentrate their rear security forces only around mission essential assets. Because support units often will not have protection from an external security force, all support facilities must be able to defend themselves against all but the most severe threats.⁸⁷ As this paper discusses, the actual capabilities of the Army's combat service support units fall short of this doctrinal ideal.

Appendix E: Organizations for AirLand Battle.

Battalions consist of two or more, but normally three to five, organic operational companies with a headquarters company to provide command and control, administrative, and support functions. Brigade commanders may reorganize or augment their battalions for specific missions to create combined arms task forces. Depending on their mission, they may receive the full range of support of combat support and service support units. Artillery battalions routinely provide fire support to maneuver battalions. Battalions perform single tactical missions as part of a brigade.⁸⁸ Without resupply once or twice a day, battalions cannot continue to operate.

Brigades consist of two or more, but normally three to five, battalions. Brigade-size units (other than Armored Cavalry Regiments and Separate Brigades) have no organic battalions. Only the brigade Headquarters and Headquarters Company is organic to these divisional brigades. Division commanders may attach any combination of different types of battalions to a brigade headquarters based on the mission and situation.⁸⁹ In practice, divisional battalions have a habitual association with one brigade headquarters.

Brigade commanders synchronize the actions of their attached battalions to accomplish one combat mission at a time. With standard augmentation of support units, heavy brigades are capable of limited independent action and self-support.⁹⁰

ENDNOTES

¹Carl von Clausewitz, *On War* (Princeton, NJ: Princeton University Press, 1976), 89; and Michael Handel, *Clausewitz and Modern Strategy* (London, England: Frank Cass and Company Limited, 1986), 58-62.

²US Army, *TRADOC PAM 525-5, AirLand Operations: A Concept for the Evolution of AirLand Battle for the Strategic Army of the 1990s and Beyond* (Fort Monroe, Virginia: Department of the Army; Headquarters, US Army Training and Doctrine Command, 1 August 1991), hereafter cited as *ALO*.

³*ALO*, 3 and 9. Combined Arms Center Development Activity, *AirLand Battle Future, Alternate Base Case Study, Phase V*, (Ft. Leavenworth, KS: 26 February 1990), p. IV-7, hereafter all AirLand Battle Future documents will be referred to as *ALB-F* with the appropriate phase number. *ALB-F* definition of nonlinear battlefield: "a battlefield upon which the commander, either by choice or the lack of maneuver forces to cover all the terrain, has placed his forces in dispersed, noncontiguous areas from which he can operate to destroy enemy forces within his area of operations. Emphasis is on destruction of enemy force rather than terrain retention." Author's addition: operating in nonlinear positions denies mutual support with friendly adjacent units on two or more sides. Linear warfare allows mutual support on three sides. During nonlinear warfare linear dispositions may occur, but only temporarily. Thus, lines of communication *usually will not* be secure. Nonlinearity should be measured in three dimensions: the echelon(s) at which it occurs, its frequency, and its duration.

⁴Hereafter combat service support units will be referred to as "support units," or simply, "support." Combat Service Support: activities that maintain men and equipment. They accomplish six functions: man, arm, fuel, fix, transport, and protect (protect the support system). Closely related to combat service support is sustainment: a process that maintains the ability of units to accomplish their mission. In the case of combat forces at the tactical level, sustainment results from combat service support activities, and it maintains their ability to generate combat power.

⁵US Army, *FM 100-5, Operations* (Washington, DC: Department of the Army, 5 May 1986), 2, hereafter cited as *FM 100-5*.

⁶Ibid., 19-21, 101-107, 137-138.

⁷Ibid., 2.

⁸David H. Mamaux, "The U.S. Army and Nonlinear Operations: Does Training Match the Doctrine?" (School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 8 December 1986), 22-28. There are two exceptions to support units not having armored vehicles: the Field Artillery Armored Support Vehicle, and the M88A1 Recovery Vehicle.

⁹US Army, *FM 71-100, Division Operations* (Washington, DC: Department of the Army, 16 June 1990), pp. 1-10 and 1-14, hereafter called *FM 71-100*.

¹⁰*ALO*, 13.

¹¹Ibid., 15.

¹²H. Lawrence Garrett III, A. M. Gray, Frank B. Kelso II, "The Way Ahead," *Marine Corps Gazette* (April 1991, pp.1-13 of Supplement), 3.

¹³*ALB-F, Phs. II*, p. IV-A-5.

¹⁴Ibid.

¹⁵*ALO*, 9.

¹⁶These criteria come from statements in *ALB-F, Phs. I*, p. VII-7, and *FM 100-5*, 60.

¹⁷*ALO*, 33.

¹⁸The main difference between the 1944 comb. command and the brigade proposed for AirLand Operations is that the only unit organic to the combat command was the headquarters. The 1944 armored division contained three combat commands that were purely command and control headquarters. The division commander assigned maneuver battalions, combat support, and combat service support to them based on the mission and the situation. See Christopher R. Gabel, "The Lorraine Campaign: An Overview, September - December 1944" (Fort Leavenworth, KS: Combat

Studies Institute, US Army Command and General Staff College, April 1985), 13.

¹⁹Combat Command A, 4th Armored Division, "The Nancy Bridgehead," (Fort Knox, KY: 1946; reprint, Fort Knox, KY: September 1985, located Fort Leavenworth, KS, US Army Command and General Staff College, library archives, # N-16696), 4, hereafter referred to as *Nancy Bridgehead*.

²⁰Hanson W. Baldwin, *Tiger Jack* [biography of John S. Wood] (Fort Collins, CO: The Old Army Press, 1979), 146.

²¹Gabel, *4th AD*, 5, 6, 8; and Barnes, 52.

²²*Ibid.*, 8.

²³*Ibid.*, 11.

²⁴Hugh M. Cole, ed, *The Lorraine Campaign, U.S. Army in World War II, European Theater of Operations* (Washington, DC: Historical Division, US Army, 1950), 70-90.

²⁵*Ibid.*, 78-87.

²⁶*Ibid.*, 85-86, and Map No. 11.

²⁷Gabel, *4th AD*, 14; and *Nancy Bridgehead*, 9, 10.

²⁸"4th Arm'd Div G-2 Periodic Rpts, 18 Jul--31 Dec 1944," (Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS, 13 September 1944, microfilm box number 3133), 18. Note: CCA's line of support to Dieulouard were never secure because of constant enemy action throughout the area. The time of the specific counterattack mentioned in this report is unknown (except that it occurred on the 13th), but it illustrates the danger that CCA faced on all sides during the penetration.

²⁹Cole, 86; and L.E. Fleischman, "After Action Report, 1 September to 30 September 1944," *After Action Report, 4th Armored Div Arty*, (Combined Arms Research Library, US Army Command and General Staff

College, Fort Leavenworth, KS, 30 September 1944, pp. 20-21, ref. no. N-12563), 20, hereafter cited as *Div Arty AAR*.

³⁰*Nancy Bridgehead*, 9.

³¹*Ibid.*, 9-10.

³²*Ibid.*, 11.

³³Cole, 96-99, and Map No. 11.

³⁴*Nancy Bridgehead*, 10.

³⁵Cole, 87; and *Nancy Bridgehead*, 10.

³⁶*Nancy Bridgehead*, 15.

³⁷Cole, 87-89; *Nancy Bridgehead*, 12-13; and *Div Arty AAR*, 21.

³⁸*Nancy Bridgehead*, 15.

³⁹*Ibid.*, 15-23.

⁴⁰Gabel, *Nancy*, 20-21; *Nancy Bridgehead*, 22; Cole, 75-86; and Lowell A. Spires, "After Action Report for September and October 1944," *After Action Report, Sep-Nov 44, ETO-4th Armd Div* (Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS: 30 September 1944, Ref. No. N-12562.2), hereafter cited as *4th AD AAR*.

⁴¹*Nancy Bridgehead*, 17.

⁴²*Ibid.*, 19-21.

⁴³*FM 100-5*, 2.

⁴⁴*Ibid.*, 106-107, 137.

⁴⁵*FM 71-100*, pp. 1-10 and 1-14.

⁴⁶*Ibid.*, pp. 1-10 and 1-14.

⁴⁷*Ibid.*, pp. 1-10.

⁴⁸U.S. Army, *FM 63-20, Forward Support Battalion* (Washington DC: Department of the Army, 26 February 1990), p. 2-12, hereafter referred to as *FM 63-20*.

⁴⁹U.S. Army, *FM 71-3, Armored and Mechanized Infantry Brigade* (Washington, DC: Department of the Army, 11 May 1988), p. 7-6, hereafter cited as *FM 71-3*.

⁵⁰*FM 71-3*, p. 7-6. *FM 63-20*, pp. 2-12 and 2-13.

⁵¹*FM 100-5*, 4, 60, 61; and U.S. Army, *FM 100-10, Division Operations* (Washington, DC: Department of the Army, 11 May 1988), p. 1-6, 2-12, 9-1.

⁵²*FM 71-3*, pp. 7-4.

⁵³*FM 63-20*, p. 2-5.

⁵⁴*FM 63-20*, Chapter 5.

⁵⁵*ALO*, 4, 22.

⁵⁶*Ibid.*, 17, 23, 25.

⁵⁷*ALB-F, Phs. III*, p. V-15.

⁵⁸*ALB-F, Phs. X*, pp. V-8 and V-9.

⁵⁹"Armor Division Clear Alternative," organization charts (in possession of Mr. Earnest Torak, Force Design Directorate, Combined Arms Command, Ft. Leavenworth, KS, 18 July 1991), photocopied; and *ALO*, 24, 38-39; *ALB-F, Phs. II*, p. IV-A-9; and *ALB-F, Phs. IV*, p. IV-1. At the General Officer's Work Shop held at Fort Lee, Virginia on 18-19 April 1990, LTG Salomon, Commanding General of the Logistics Center, provided the following guidance [the Base Case Study paraphrases his guidance]: "We need to reform the logistics system to fight the non-linear battle. Need to unweight the maneuver battalions. Division level (MSB) logistics needs to be displaced by FSB and COSCOM capabilities."

⁶⁰ALO, 24, 25.

⁶¹ALB-F, Phs. III, p. V-10.

⁶²ALB-F, Phs. II, p. V-6; and ALB-F, Phs. III, pp. VIII-6 and IX-15.

⁶³ALB-F, Phs. III, p. V-10.

⁶⁴ALB-F, Phs. I, p. VII-7.

⁶⁵ALB-F, Phs. III, p. V-2.

⁶⁶Mack McNair, Major, US Army, interview by author, 21 October 1991, Ft. Leavenworth, KS, written notes, Force Modernization Directorate, Combined Arms Command (hereafter cited as McNair). An article in *Jane's Defense Weekly* (Christopher F. Foss, "US Army: the Next Century," 12 October 1991, pp. 669-670) supported this statement. Because of the decreased budget the Army is reevaluating the need for the Future Armored Resupply Vehicle-Ammunition (FARV-A) and the M88 Improved Recovery Vehicle.

⁶⁷US Army, *Weapon Systems* (Washington, DC: Department of the Army, 15 January 1987), 80-81; and US Army, *Weapon Systems* (Washington, DC: Department of the Army, 1 March 1990), 80-81.

⁶⁸See ALO, 23; ALB-F, Phs. II, pp. VIII-1 through VIII-4.

⁶⁹"Armor Division Clear Alternative;" and Barret, Raymond D. Jr., "Coherence Between Airland Battle and Contemporary Force Structure at Corps, Division, and Brigade Level" (School for Advanced Military Studies monograph, Fort Leavenworth, KS: US Army Command and General Staff College [hereafter cited as CGSC], 1985), 101-110; and Burkhardt, Robert W., "Brigade Organization and the Airland Battle" (School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 2 December 1985), 32-35.

⁷⁰"Armor Division Clear Alternative."

⁷¹ALO, 16, 17.

⁷²Ibid., 16.

⁷³Ibid., 16, 21.

⁷⁴Ibid., 17.

⁷⁵Ibid., 15.

⁷⁶Ibid., 11, 15.

⁷⁷Ibid.

⁷⁸Ibid., 11, 15, 49.

⁷⁹The text and diagrams that are the basis for the dimensions shown here are in *ALB-F, Phs. II*, p. IV-B-2, V-3, and IV-C-4 through 7.

⁸⁰*ALO*, 15, 47.

⁸¹Ibid., 11, 15. Among other systems, overlap occurs between Air Force interdiction, Army air cavalry, attack helicopters, indirect fires, and maneuver forces.

⁸²Ibid., 11, 15, 47.

⁸³*FM 100-5*, 19-21.

⁸⁴Ibid., 19.

⁸⁵Ibid., 19, 20.

⁸⁶Ibid., 20, 39.

⁸⁷Ibid.

⁸⁸Ibid., 184.

⁸⁹Ibid.

⁹⁰Ibid.

BIBLIOGRAPHY

Government Publications

- Cole, Hugh M., ed. *The Lorraine Campaign, U.S. Army in World War II, European Theater of Operations*. Washington, DC: Historical Division, US Army, 1950.
- Combat Command A, 4th Armored Division. "The Nancy Bridgehead." Fort Knox, KY: 1946; reprint, Fort Knox, KY: September 1985. Located Fort Leavenworth, KS, US Army Command and General Staff College, library archives, # N-16696.14-3.
- Gabel, Christopher R. "The 4th Armored Division in the Encirclement of Nancy." Fort Leavenworth, KS: Combat Studies Institute, US Army Command and General Staff College, April 1986.
- Gabel, Christopher R. "The Lorraine Campaign: An Overview, September - December 1944." Fort Leavenworth, KS: Combat Studies Institute, US Army Command and General Staff College, April 1985.
- U.S. Army. *FM 17-42, Armored Infantry Battalion*. Washington, DC: War Department, 10 November 1944.
- _____. *FM 63-20, Forward Support Battalion*. Washington, DC: Department of the Army, 17 May 1985.
- _____. *FM 63-20, Forward Support Battalion*. Washington, DC: Department of the Army, 26 February 1990.
- _____. *FM 63-21, Main Support Battalion*. Washington, DC: Department of the Army, 18 February 1986.
- _____. *FM 63-21, Main Support Battalion*. Washington, DC: Department of the Army, 7 August 1990.
- _____. *FM 71-3, Armored and Mechanized Infantry Brigade*. Washington, DC: Department of the Army, 11 May 1988.
- _____. *FM 71-100, Division Operations*. Washington, DC: Department of the Army, 16 June 1990.

- _____. *FM 90-14, Rear Battle*. Washington, DC: Department of the Army, 10 June 1985.
- _____. *FM 100-5, Operations*. Washington, DC: Department of the Army, 5 May 1986.
- _____. *FM 100-10, Combat Service Support*. Washington, DC: Department of the Army, 18 February 1988.
- _____. *TRADOC PAM 11-9, Army Programs, Blueprint of the Battlefield*. Virginia: Department of the Army; Headquarters, US Army Training and Doctrine Command, 27 April 1990.
- _____. *TRADOC PAM 525-5, AirLand Operations: A Concept for the Evolution of AirLand Battle for the Strategic Army of the 1990s and Beyond*. Fort Monroe, Virginia: Department of the Army; Headquarters, US Army Training and Doctrine Command, 1 August 1991.
- _____. *Weapon Systems*. Washington, DC: Department of the Army, 15 January 1987.
- _____. *Weapon Systems*. Washington, DC: Department of the Army, 1 March 1990.

Government School Publications

- Barnes, Richard H. "Arracourt -- September 1944." School for Advanced Military Studies monograph, Fort Leavenworth, KS: US Army Command and General Staff College (hereafter cited as CGSC), 1982.
- Barret, Raymond D. Jr. "Coherence Between AirLand Battle and Contemporary Force Structure at Corps, Division, and Brigade Level." School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 1985.
- Brudvig, Dale K. "The Brigade With or Without Combat Support and Combat Service Support." Carlisle Barracks, PA: US Army War College, 28 May 1976.

- Burkhardt, Robert W. "Brigade Organization and the AirLand Battle." School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 2 December 1985.
- Davenport, Brian W. "Tactical Survivability of Divisional Combat Service Support Units on the Airland Battlefield?" School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 6 December 1985.
- Izzo, Lawrence L. "An Analysis of Manstein's Winter Campaign on the Russian Front, 1942-1943: A Perspective of the Operational Level of War and Its Implications." School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 1986.
- Kindsvatter, Peter S. "An Appreciation for Moving the Heavy Corps: The First Step in Learning the Art of Operational Maneuver." School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 1986.
- Mamaux, David H. "The U.S. Army and Nonlinear Operations: Does Training Match the Doctrine?" School for Advanced Military Studies monograph, Fort Leavenworth, KS: CGSC, 8 December 1986.

Unpublished Sources

- "4th Arm'd Div G-2 Periodic Rpts, 18 Jul -- 31 Dec 1944." Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS, 13 September 1944, microfilm box number 3133.
- "Armor Division Clear Alternative." Organization charts. In possession of Mr. Earnest Torak, Force Design Directorate, Combined Arms Command, Ft. Leavenworth, KS, 18 July 1991. Photocopied.
- Combined Arms Center Development Activity. *AirLand Battle Future, Alternate Base Case Study, Phase I*. Ft. Leavenworth, KS. 26 February 1990.
- _____. *AirLand Battle Future, Alternate Base Case Study, Phase II*. Ft. Leavenworth, KS. 30 March 1990.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase III.* Ft. Leavenworth, KS. 19 April 1990.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase IV.* Ft. Leavenworth, KS. 4 June 1990.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase V.* Ft. Leavenworth, KS. 18 June 1990.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase VI.* Ft. Leavenworth, KS. 13 September 1990.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase VII.* Ft. Leavenworth, KS. 1 February 1991.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase VIII.* Ft. Leavenworth, KS. 20 March 1991.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase IX.* Ft. Leavenworth, KS. 5 June 1991.

_____. *AirLand Battle Future, Alternate Base Case Study, Phase X.* Ft. Leavenworth, KS. 10 July 1991.

Fleischman, L.E. "After Action Report, 1 September to 30 September 1944." *After Action Report, 4th Armored Div Arty.* Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS, 30 September 1944, 20-21. Ref. No. N-12563.

McCormick, Otis, ed. "AGF [Army Ground Forces] Report. Tactics and Administration, Armored Division." War Department Observers Board; Headquarters, European Theater of Operations; United States Army: 1 June 1945. Located Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS, Ref. No. 10482.

McNair, Mack, Major, US Army. Interview by author, 21 October 1991, Ft. Leavenworth, KS. Written notes. Force Modernization Directorate, Combined Arms Command.

Spires, Lowell A. "After Action Report for September and October 1944." *After Action Report, Sep-Nov 44, ETO-4th Armd Div.* Combined Arms Research Library, US Army Command and General Staff College, Fort Leavenworth, KS, 30 September 1944. Ref. No. N-12562.2.

Articles

Foss, Christopher F. "US Army: the Next Century." *Jane's Defense Weekly*, 12 October 1991, 669-675.

Garrett, H. Lawrence III, A. M. Gray, Frank B. Kelso II. "The Way Ahead." *Marine Corps Gazette*, April 1991, pp. 1-13 of Supplement.

Books

Clausewitz, Carl von. *On War*. Princeton, NJ: Princeton University Press, 1976.

Baldwin, Hanson W. *Tiger Jack* [biography of John S. Wood]. Fort Collins, CO: The Old Army Press, 1979.

Handel, Michael. *Clausewitz and Modern Strategy*. London, England: Frank Cass and Company Limited, 1986.

Huston, James A. *The Sinews of War: Army Logistics, 1775-1953*. Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1966.

Koyen, Kenneth A. *The Fourth Armored Division: From the Beach to Bavaria*. Munich, Germany: Herder-Druck, April 1946.

Mellenthin, F.W. von. *Panzer Battles*. New York: University of Oklahoma Press, 1956 (reprinted in NY by Ballantine Books in 1971).